

PONY
سلسلة كتب الأستاذ

2026

Science

Main Book



4

Primary
First Term

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Unit 1 Living Systems



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Theme

1

Systems

Unit

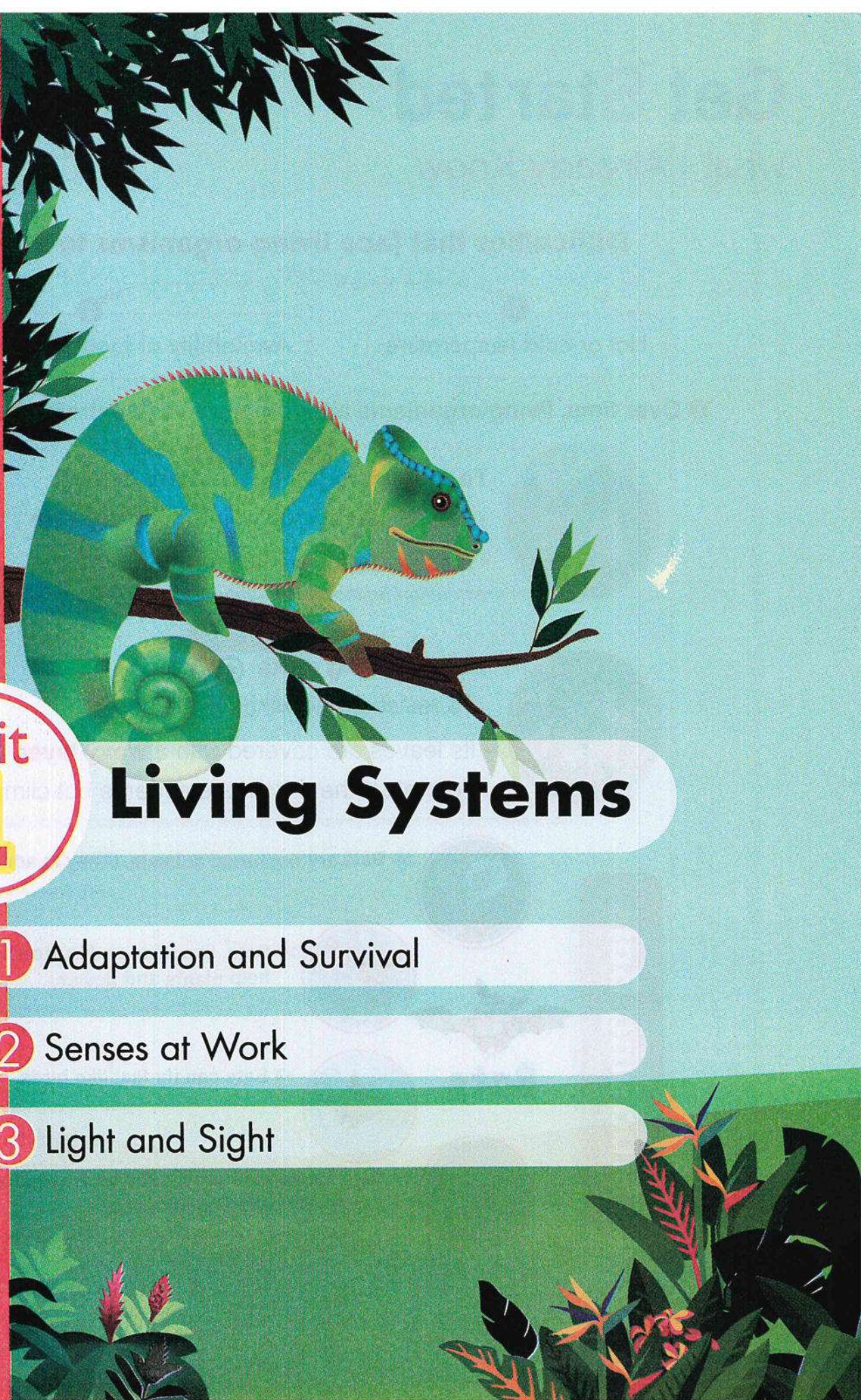
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Living Systems

Concept 1 Adaptation and Survival

Concept 2 Senses at Work

Concept 3 Light and Sight



Get Started

What I Already Know

Difficulties that face living organisms to survive:

1

Hot or cold temperature

2

Availability of food, water, or shelter

» Over time, living organisms adapt to survive in extreme hot conditions.

Camel



To survive in the hot and dry desert:

- Its body is covered with **thick hairy skin**.
- It stores **fats** in its **hump**.

Palm Tree



- It has **strong roots**. **GR**

To resist strong winds in the desert.

- Its leaves are covered with a **waxy layer**. **GR**

To protect them from the extreme hot climate.

Studying Bats



Bats



» Bats are **nocturnal animals**. (They're active at night.)

الخفافيش كائنات ليلية؛ أي تنشط في الليل.



» Bats, like bees and butterflies, can help **plants** and **flowers**.

الخفافيش، مثل النحل والفراشات، تستطيع مساعدة النباتات والزهور.



» Bats can fly fast like birds.

الخفافيش تستطيع الطيران بسرعة كالطيور.



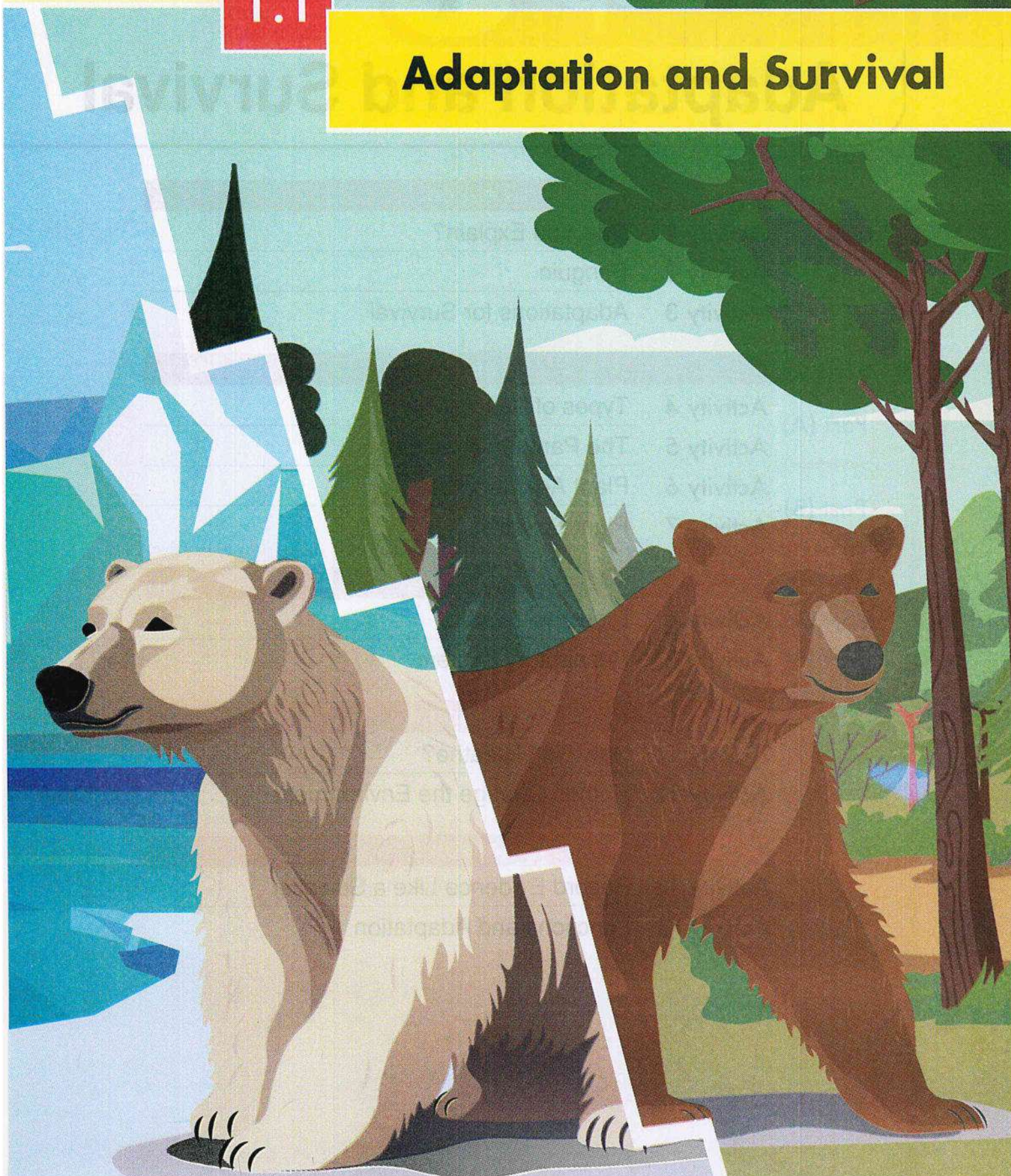
» Bats locate their prey, such as mosquitoes, with a property called **echolocation**.

الخفافيش تستخدم خاصية تحديد الموقع بالصدى لمعرفة مكان الفريسة، مثل البعوض.

Concept

1.1

Adaptation and Survival



Concept 1

Adaptation and Survival

Lesson 1

Activity 1	Can You Explain?
Activity 2	Penguin
Activity 3	Adaptations for Survival

Lesson 2

Part (A)	Activity 4	Types of Adaptations
	Activity 5	The Panther Chameleon
Part (B)	Activity 6	Plant Adaptations
	Activity 7	Plant Scientist

Lesson 3

Part (A)	Activity 8	Digestive System
Part (B)	Activity 9	Respiratory System

Lesson 4

Activity 10	How Fish Breathe?
Activity 11	Human Change the Environment

Lesson 5

Activity 12	Record Evidence Like a Scientist
Activity 13	Functions and Adaptation

Glossary

Lesson (1)

Activity (1)

Living organisms	الكائنات الحية	Survive	يظل على قيد الحياة	Adapt	يتكيف
Adaptation	التكيف	Reproduce	يتكاثر	Reproduction	التكاثر
Extinct	ينقرض	Extinction	انقراض	Store	يخزن
Fats	الدهون	Shaded areas	أماكن الظل	Bury	يدفن
Rodents	القوارض	Reptiles	الزواحف	Camel	الجمال
Lizard	السحلية	Climate	مناخ	Hump	السنام

Activity (2)

Penguin	البطريق	Antarctica	القارة القطبية الجنوبية	Polar climate	مناخ قطبي
Non-flying bird	طائر لا يطير	Fat layer	طبقة من الدهون	Dense feathers	ريش كثيف
Blood vessels	أوعية دموية	Weave around	تلتف حول	Barefoot	حافي القدمين
Toes	أصابع القدم				

Activity (3)

Polar bear	الدب القطبي	Brown bear	الدب البني	Black bear	الدب الأسود
Desert lizard	سحلية الصحراء	Fennec fox	ثعلب الفنك	Caracal	الوشق البري
Scales	حراشف	Fur	فراء	Sneak up	يتسلل
Blend	يندمج	Arctic region	القطب الشمالي	Habitat	موطن
Environment	البيئة	Camouflage	التخفي	Predator	المفترس
Prey	الفريسة				

Lesson (2)

Activity (4)

Structural adaptation	تكيف تركيبى	Behavioral adaptation	تكيف سلوكي	Migration	الهجرة
Panting	اللهث	Burrow	جحر	Flexible	مرن
Lose	يفقد	Tundra	صحراء التندرا الجليدية	Arctic fox	الثعلب القطبي
Bull shark	قرش الثور	Countershading	التباين اللوني	Competition	منافسة
Fresh water	المياه العذبة	Salt water	المياه المالحة	Sense of hearing	حاسة السمع
Hunting	الصيد				

Activity (5)

Panther chameleon	حرباء النمر	Tropical rainforest	غابة استوائية	Independently	بشكل منفصل
Branch	فرع شجرة	Puff	ينفخ	Claws	مخالب

Activity (6)

Acacia trees	أشجار السنط	Kapok trees	أشجار الكابوك	Grassland	موطن عشبي
Soggy soil	ترية طينية	Savannah	السافانا	Amazon rainforests	غابات الأمازون
Leaves	الأوراق	Roots	الجذور	Seeds	بذور
Trunk	الجذع	Lack	نقص	Deep	عميق
Buttress roots	الجذور الداعمة	Taproot	الجذر الوتدي	Giraffe	الزرافة
Poison	سم	Smelly messages	روائح مميّزة	Spines = Needles	أشواك

Activity (7)			
Wetland	مستنقعات	Resist	تقاوم
Barbary fig	التين الشوكي	Water lily	زنبق الماء
Mangrove tree	شجرة المانجروف	Float	تطفو
		Palm tree	نخلة
		Pine tree	شجرة الصنوبر
		Triangular shape	شكل مثلثي

Lesson (3)

Activities (8) & (9)			
Systems	أجهزة	Organs	أعضاء
Respiratory system	الجهاز التنفسي	Digestion process	عملية الهضم
Nutrients	عناصر غذائية	Mouth	الفم
Saliva	اللعاب	Tongue	اللسان
Chewing	المضغ	Swallowing	البلع
Esophagus	المريء	Liver	الكبد
Pancreas	البنكرياس	Secrete	يفرز
Small intestine	الأمعاء الدقيقة	Large intestine	الأمعاء الغليظة
Respiration	عملية التنفس	Get rid	تتخلص من
Trachea	القصبه الهوائية	Two lungs	الرئتان
Bronchi	شعب هوائية	Bronchioles	القصبيات
Chest	الصدر	Contract	ينكمش
Inhalation	شهيق	Exhalation	زفير
		Digestive system	الجهاز الهضمي
		Functions	وظائف
		Teeth	الأسنان
		Crush	تكسير - تفتيت
		Throat (pharynx)	البلعوم
		Stomach	المعدة
		Muscular tube	أنبوب عضلي
		Anus	فتحة الشرج
		Nose	الأنف
		Diaphragm	الحجاب الحاجز
		Alveoli	الحويصلات الهوائية
		Relax	يتمدد

Lesson (4)

Activity (10)			
Gills	خياشيم	Inhale	يستنشق
Exhale	يخرج		
		Lungs	الرئتان

Activity (11)			
Human activities	أنشطة بشرية	Building communities	بناء المدن
Clearing land	تجريف التربة	Cars exhausts	عوادم السيارات
Ecosystem	بيئة	Asthma	الربو
Replanting	إعادة زراعة		
		Cutting down forests	قطع أشجار الغابات
		Soil pollution	تلوث التربة
		Heart diseases	أمراض القلب

Lesson (5)

Activities (12) & (13)			
Amphibians	برمائيات	Moist	رطب
Species	فصائل	Frog	ضفدع
Salamander	سلمندر	Skin	جلد
Extinction	الانقراض	Water stream	مجرى المياه
Sensitive	حساسة	Throwing waste	إلقاء المخلفات
		Endangered species	مهددة بالانقراض
		Toads	ضفدع الطين
		Extinct	تقرض
		Water ponds	مياه البرك

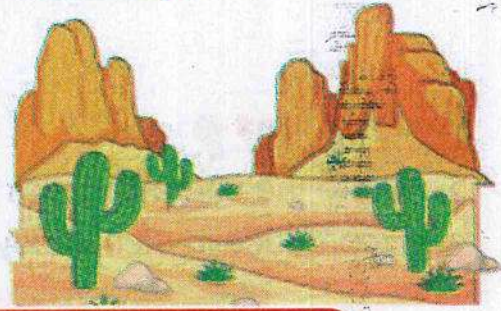
Lesson

1

Activity 1 Can You Explain?

- » Deserts are **very hot** and **dry places**.
- » It is hard for plants and animals to survive there due to these **extreme conditions**.

- تعتبر الصحارى من الأماكن شديدة الحرارة و الجفاف.
- من الصعب على النباتات و الحيوانات أن تعيش في هذه الظروف القاسية.



How do **animals** survive in the desert?



Camel stores fats in its hump. (G.R)

To survive in the dry desert.



Desert lizard searches for shade. (G.R)

To stay cool in the hot desert.



Rodents and reptiles bury themselves and become more active at night. (G.R)

To stay cool in the hot desert.

كيف تتمكن الحيوانات في الصحراء من البقاء على قيد الحياة؟

① الجمل يخزن الدهون في سنامه، ليتمكن من النجاة في الصحراء الجافة.

② سحلية العجمة تبحث عن الظل، لتحافظ على برودة جسمها في الصحراء الحارة.

③ القوارض و الزواحف تدفن نفسها في الرمال، وتنشط أكثر في الليل، لتحافظ على برودة جسمها في الصحراء الحارة.

All these ways that help living organisms
to survive in the desert are called "**adaptations**".

Adaptations

They are the characteristics that help living organisms survive and reproduce in their ecosystem.

التكيف: عبارة عن الخصائص التي تساعد الكائنات الحية على البقاء على قيد الحياة والتكاثر في نظامها البيئي.

Ecosystem

It is an area in which living organisms and non-living things interact with each other.

النظام البيئي: منطقة تتفاعل فيها الكائنات الحية والأشياء غير الحية.



» If living organisms adapt, they **survive** and **reproduce**.

» If living organisms can't adapt, they **die** or **extinct**.



Check your understanding?

» Put (✓) or (X):

- 1 It is difficult for animals to live in the desert. ()
- 2 In the desert ecosystem, it is easy to find water. ()
- 3 Camel can store water in its hump. ()
- 4 Most desert animals prefer to become active at night. ()

Activity 2 Penguin

Climate is considered one reason for adaptation for many living organisms over generations.

يعتبر المناخ سببًا من أسباب تكيف العديد من الكائنات الحية.

EX: Penguins

- Unlike birds, Penguin is a non-flying bird that can't fly.

البطريق طائر، لكنه، على عكس الطيور الأخرى، لا يطير.

Habitat Antarctica

Antarctica has a **polar climate** that is one of the coldest places on Earth.

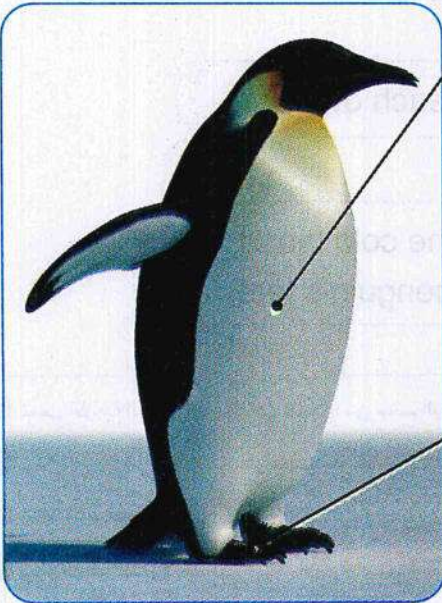
تتمتع قارة أنتاركتيكا بمناخ قطبي، وهي أحد أبرد الأماكن على الأرض.



Its body

Penguin's body is covered with **thick fat layer** and **dense feathers** to keep its body warm.

جسم البطريق مغطى بريش كثيف وطبقة سميكة من الدهون، حتى يشعر بالدفء.



Its feet

Penguin's feet have no feathers.

أرجل البطريق ليس لها ريش.

Penguins can stand on ice all day.



يستطيع البطريق الوقوف على الثلج طوال اليوم.

Humans cannot stand on ice all day, and they lose the feeling in their toes after only two minutes.

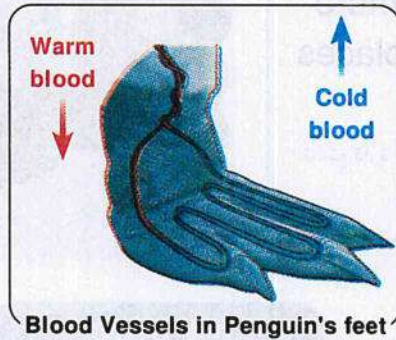


لا يستطيع الإنسان الوقوف على الثلج طوال اليوم وقد يفقد الإحساس بأصابع قدميه بعد مرور دقيقتين فقط.

Why don't penguin's feet freeze?

1

Blood vessels bring **warm blood** down from the body to the feet.



Blood Vessels in Penguin's feet

2

Other blood vessels bring **cold blood** up from the feet to the body.

3 The blood vessels weave around each other.

↓ So,

4 The warm blood vessels heat up the cold blood vessels and the heat transfers to penguin's feet.

1 تحمل الأوعية الدموية الدم الدافئ لأسفل؛ من جسم البطريق إلى قدميه.

2 تحمل الأوعية الدموية الدم البارد لأعلى؛ من قدمي البطريق إلى جسمه.

3 تلتف الأوعية الدموية حول بعضها.

4 تقوم الأوعية الدموية الدافئة بتدفئة الأوعية الدموية الباردة، فتنتقل الحرارة إلى قدمي البطريق.



- The penguin's feet don't freeze because the blood flowing down is warm enough to keep their toes from freezing.

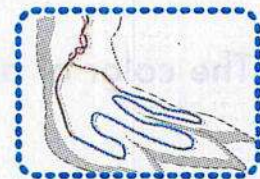
• لا تتجمد أرجل البطريق لأن الدم المتدفق لأسفل يكون دافئاً بما يكفي لحماية أصابع البطريق من التجمد.

Give a reason for:

- The blood vessels in the penguin's feet weave around each other.

- To keep its feet (toes) from freezing as the warm

blood vessels heat up the cold blood vessels.



What happens if:

- The blood vessels in penguin's feet don't weave around each other?

- The penguin's feet will freeze.



Check your understanding?

» Put (✓) or (X):

- 1 The penguin's feet don't freeze because they are covered with thick feathers. ()
- 2 A penguin is not a bird because it can't fly. ()

Activity 3 Adaptations for Survival

» Complete the following sentences using these words (desert- snow):

- 1 The rabbit with the white fur lives in
- 2 The rabbit with the sandy fur lives in



The color of animal helps it to hide and this is called "**Camouflage**".

Camouflage

It is a type of adaptation in which an animal blends in with the surrounding environment to hide from predators or sneak up on prey.

التخفي: هو أحد أنواع التكيف، حيث يقوم الحيوان بالتخفي في البيئة المحيطة به، وذلك للاختباء من الحيوانات المفترسة أو التسلل للفرائس.

Animals use camouflage:

To hide from **predators** (enemies).

To sneak up on **prey**.

Predator is an animal that hunts (eats) another animal.

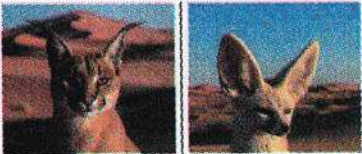
المفترس: الحيوان الذي يصطاد
(يتغذى على) حيوان آخر.



Prey is an animal that is hunted (eaten) by another animal.

الفريسة: الحيوان الذي يصطاده
(يتغذى عليه) حيوان آخر.

Examples of camouflage:

Animal	Habitat	Its color	Reason
Polar bear 	Arctic region	White fur	To blend in with the snow and sneak up on its prey. Thick fur helps polar bear to stay warm in cold environment.
Black bear and brown bear 	Forest	Dark fur	To hide among trees during hunting.
Caracal and fennec fox 	Desert	sandy-colored fur (Tan-colored fur)	To hide and blend in with the desert landscape.
Desert lizard 	Desert	Colorful scales	To hide among colorful rocks.

Habitat	موطن	Arctic region	القطب الشمالي	Forest	غابة
Blend in	يتخفى	Sneak up	يتسلل	Hide	يتخفى
Fur	فراء	Colorful	ملونة	Scales	حراشف

» Habitat is the environment where living organisms live.

» Both the Arctic region and Antarctica are Polar Regions.

- الموطن هو البيئة التي تعيش فيها الكائنات الحية.
- القطب الشمالي والقطب الجنوبي منطقتان قطبيتان.

What happens if:

① The body of fennec fox is covered with a black fur?

- It can't hide and hunt its prey in the desert environment.

② The polar bear has a thin fur instead of thick fur?

- It can't adapt the extreme cold weather, so it dies.



Check your understanding?

» Put (✓) or (X):

- | | |
|--|-----|
| ① The dark fur of a forest bear helps it in hunting. | () |
| ② Camouflage means an animal could be easily seen. | () |
| ③ Desert lizard has colorful fur to hide among colorful rocks. | () |
| ④ Polar bear has thick fur to make camouflage. | () |

Lesson One

Answered

1 Choose the correct answer:

1.  Adaptation helps living organisms in all the following, except

(Cairo 2024)

- (a) surviving (b) reproduction (c) growing (d) death

2.  Polar bears have a white fur to

(Cairo 2025)

- (a) live in the desert (b) see in the dark
(c) live in the forest (d) hide from their prey

3. The keeps its body cool by staying in shaded areas during daytime.

- (a) agama lizard (b) Arctic fox (c) brown ear (d) polar bear (Giza 2022)

4. Warm blood transfers to the penguin's feet with the help of its

- (a) blood vessels (b) skin (c) head (d) feather (Cairo 2022)

5. Penguins live in Antarctica, which is considered a region.

- (a) desert (b) forest (c) tropical (d) polar

6.  A penguin's feet stay warm due to its

- (a) fat layer (b) blood vessels (c) features (d) fur

7. If you stand barefoot on ice, you lose feeling in your toes after a few

- (a) seconds (b) minutes (c) hours (d) days (Giza 2022)

8. A polar climate

(Cairo 2023)

- (a) is the hottest place on Earth (b) is the coldest place on Earth
(c) looks like the desert climate (d) looks like the forest climate

9. The penguin's feet have blood vessels that bring up to its body.

- (a) warm blood (b) cold water (c) warm water (d) cold blood

(Alex. 2023)

10. All of these are adapted to live in extreme cold weather, except

- (a) polar bears (b) penguins (c) Arctic foxes (d) fennec foxes

11. A starred agama lizard could be prey for the

- (a) Arctic fox (b) polar bear
(c) fennec fox (d) brown bear

12.  The presence of thick white fur is an adaptation in (Cairo - Giza 2025)

- (a) starred agama lizard (b) forest bear
- (c) fennec fox (d) polar bear

13.  Camouflage means that an organism is

- (a) easy to be seen by predators (b) difficult to be seen
- (c) easy to be seen by the prey (d) easy to be eaten

14.  Fennec fox has to enable blending in the desert. (Port Said 2025)

- (a) dark colored fur (b) thick white fur
- (c) black colored fur (d) sandy colored fur

2 Put (✓) or (X):

1. The blood vessels in a penguin's feet are away from each other. (Suez 2023) ()

2.  Penguins' feet don't freeze due to the thick layer of fat. ()

3. The thick white fur is an adaptation in bears that live in polar regions. (Suez 2023) ()

4.  The agama lizard blends in with the green and huge trees to hide from its enemies. (Azhar 2023) ()

5. The body of penguin is covered by dense fur in order to be warm. (Cairo 2025) ()

6. Camouflage helps living organisms adapt to the climate conditions. ()

7. Forest bears have darker fur than those that live in polar regions. ()

8. Desert lizards have colorful fur to hide among the rocks. ()

9. Fennec foxes live in deserts, while caracals live in forests. ()

3 Choose from column (A) what suits it in both columns (B) & (C):

Column (A) Living Organism	Column (B) Habitat	Column (C) Body Coat
1. Penguin	(a) Forest	(a) White fur
2. Black bear	(b) Arctic region	(b) Dark fur
3. Fennec fox	(c) Antarctica	(c) Dense feathers
4. Polar bear	(d) Desert	(d) tan-colored fur

1. → 2. → 3. → 4. →

4 Write the scientific term:

-  They are the characteristics that help living organisms survive and reproduce in their ecosystems. (Cairo 2022) (.....)
- It is a non-flying bird that has dense feathers on its body. (.....)
- They weave around each other to keep the penguin's feet warm. (.....)
- It exists under the penguin's skin to keep it warm in cold weather. (.....)
- It is the place where a living organism lives. (.....)
-  It is a type of adaptation that helps animals hide from a predator or sneak up on its prey. (Cairo 2022) (.....)
- It covers the bodies of some types of bears to blend in with the snow and keep their bodies warm. (Luxor 2023) (.....)
- It is a fox that has tan-colored fur and lives in the desert. (.....)

5 Complete the following sentences:

- The penguin's body stays warm through a thick layer of and dense (Aswan 2023)
-  White fur helps the polar bear with the ice habitat. (Alex. 2023)
- Forest bears have or colored fur, while polar bears have colored fur. (Cairo 2023)

4. Some butterflies have the same color of the tree they live on, this property is called (Cairo 2022)

5. Among animals that can live in polar environment are and

6 Cross out the odd word:

• Caracal – Fennec fox – Agama lizard – Polar bear (.....)

7 Study the following figures, then answer the questions below:



Figure (1)



Figure (2)



Figure (3)



Figure (4)

1. The animals in figures (.....) and (.....) could live in polar regions.
2. The animal in figure (.....) can hide among trees in the forest.
3. The animal in figure (.....) could live in the same habitat of agama lizards.

8 Study the following figures, then complete the sentences below:

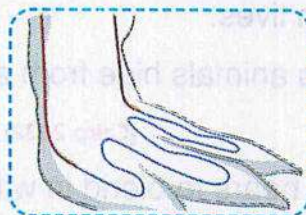


Figure (A)

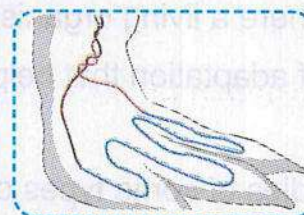


Figure (B)

1. Figure (.....) shows the blood vessels in a penguin's feet.
2. If the blood vessels in a penguin's feet looked like those in figure (.....), they would freeze.

9 Give a reason for:

1. Adaptation is important for all living organisms.

2. The starred agama lizard searches for shaded areas during the day.

.....

.....

3. A penguin can stand on ice all day.

.....

.....

4.  A penguin's body is covered with dense feathers.

.....

.....

5. The polar bear has thick, white fur.

(Minia 2023)

.....

.....

6. Some animals have the ability to make camouflage.

(Cairo 2024)

.....

.....

10 What happens if:

1. The fennec fox has black fur instead of sandy-colored fur?

.....

2. Polar bear has a thin fur instead of thick fur?

.....

3.  Living organisms can't adapt to their environment?

(Cairo 2023)

.....

11 What is meant by:

1. Adaptation?

.....

.....

2.  Camouflage?

.....

.....

Lesson

2

Part (A)

Activity 4 Types of Adaptations

An adaptation of a living organism can be:

Structural Adaptation

It is a change in a living organism's **body structure** to help it survive.

التكيف التركيبي:

هو التغير الذي يحدث في جسم الكائن الحي، ليتمكن من البقاء على قيد الحياة.

Behavioral Adaptation

It is a change in a living organism's **behavior** or **acts** to help it survive.

التكيف السلوكي:

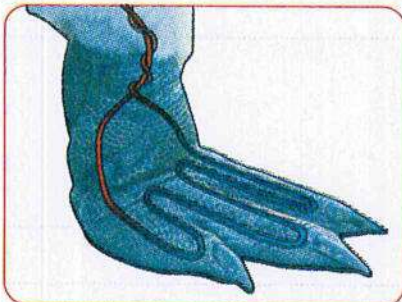
هو التغير الذي يطرأ على سلوك الكائن الحي، ليتمكن من البقاء على قيد الحياة.

Examples:

Polar bears have white fur.



The blood vessels in a penguin's feet



Bird migration



Desert lizards look for shaded areas to stay cool.



Now, we will study types of adaptations in some animals that help them survive in different habitats.

The different adaptations between fennec fox and arctic fox:

Structural adaptation:

Fennec fox

Habitat: Desert



Arctic fox

Habitat: Tundra desert



In a tundra, the temperature may reach -50°C in the winter months.

Fur

- It has a tan-colored fur (sandy-colored fur).
- To provide camouflage in sandy, rocky environments.
- To protect it from the hot sun.

لون فرائه بني داكن؛ للتخفي في البيئة الصحراوية، ولحمايته من أشعة الشمس.

- It has a thick fur coat.
- To stay warm in extreme cold weather.
- It has a white fur during winter, but it turns brown in summer when the snow melts.
- To sneak up on the prey in any season.

لون فرائه أبيض في الشتاء، ويتحول للبني وقت الصيف، للتسلل إلى الفرائس في أي فصل من فصول السنة.

Ears

- It has extra-large ears.
- To lose heat and cool its body.

له آذان طويلة؛ ليفقد الحرارة ويبرد جسمه.

- It has short ears and legs.
- To stay warm in cold weather.

له آذان وأرجل قصيرة ليبقى جسمه دافئاً.

Behavioral adaptation:

Fennec fox pants like dogs.

To cool its body (It takes up to 700 breaths per minute).

يلهث ثعلب الفنك مثل الكلب لتبريد جسمه. (يستطيع اللهث 700 مرة في الدقيقة).

The **similar adaptations** between fennec fox and arctic fox:

Structural adaptation:



Both foxes' ears have a specialized shape.

- To allow excellent hearing to help them hunt.

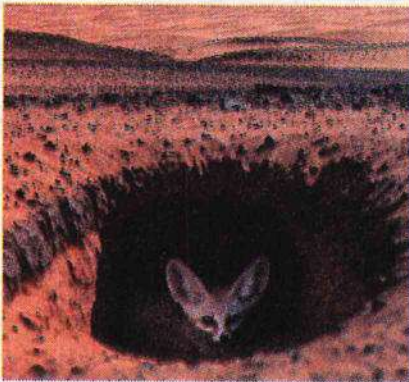
• يساعد شكل آذانهم على تقوية حاسة السمع؛ مما يساعدهما على الصيد.



Behavioral adaptation:

Both foxes stay in burrows.

Fennec fox stays in burrows during the **day** to stay **cool**.



يبقى في الجحور أثناء النهار، ليبقى جسمه باردًا.

Arctic fox stays in burrows during the **night** to stay **warm**.



يبقى في الجحور أثناء الليل، ليبقى جسمه دافئًا.

Both foxes have a varied diet and have learned to eat all kinds of food, including insects, fruits, plant roots, and the prey remains.

Because it is hard to find food in a hot, dry desert or a cold tundra.

كلاهما يأكل طعامًا متنوعًا، مثل: الحشرات و الفواكه و جذور النباتات و بقايا الفرائس، لندرة الغذاء في الصحراء الجافة الحارة أو صحراء التندرا شديدة البرودة.

Bull shark

Habitat: salt water and fresh water

Structural adaptation:

1 Its body is adapted to survive in both salt water and fresh water.

Bull sharks find **more** competition for finding food in **salt** water.



تجد أسماك قرش الثور منافسة أكثر على الطعام في المياه المالحة.

Bull sharks find **less** competition for finding food in **fresh** water.



تجد أسماك قرش الثور منافسة أقل على الطعام في المياه العذبة.

Give a reason for:

- Bull sharks find less competition for finding food in fresh water.

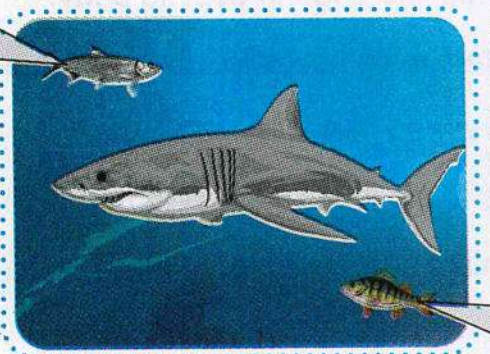
- Because most other sharks live only in salt water, and there are no other sharks in fresh water.

2 It has a **dark back** and **white belly** and it uses a Camouflage strategy called **Countershading** to sneak up on preys.

يستخدم إستراتيجية للتخفي تسمى التباين اللوني للانقراض على الفرائس.

When an animal swims above a bull shark,

it may not see the bull shark in the shadow due to its dark back.



When an animal swims underneath a bull shark,

it may not see the bull shark in the bright light of the sun due to its white belly.

3

It has sharp teeth to cut the prey's flesh.

له أسنان حادة لتمزيق لحم الفريسة.



Behavioral adaptation:

1 It hunts during the day and at night.

- To surprise its prey.

2 It eats different kinds of food (varied diet).

NOTE:

- Animals that have a **varied diet** are flexible about what they eat and where they hunt, so they are well-adapted for survival.

• الحيوانات التي تتسم بالمرونة فيما يتعلق بما تأكله وأين تصطاد، تتكيف جيدًا للبقاء على قيد الحياة.



Check your understanding?

» Classify the following sentences by putting the letter (S) for structural adaptations and the letter (B) for behavioral adaptations:

- 1 Fennec fox pants like dogs to cool its body. ()
- 2 Camel stores fats in its hump to adapt to the desert conditions. ()
- 3 Bull shark has varied diet. ()
- 4 Starred agama lizard looks for shaded area. ()
- 5 Most desert animals adapted to be more active at night. ()

Activity 5 The Panther Chameleon

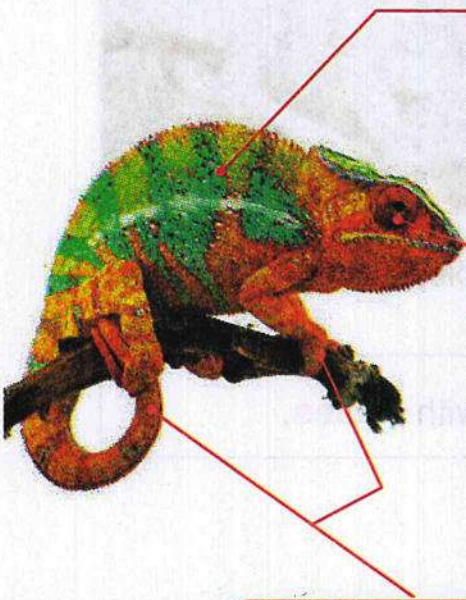
- » Reptiles are an ancient type of animals found around the world.
- » Reptiles such as panther chameleons are covered with **scales**.

Panther chameleon

Habitat: Tropical rainforest

Type: Reptile

Structural adaptation:



It has bright-colored scales.

- To hide among green leaves and colorful flowers.

• أجسامها مغطاة بحراشف ملونة للتخفي بالأوراق الخضراء والزهور الملونة.

Each eye moves independently in opposite directions.

- One eye searches for food.
- The other eye looks out for danger in a different direction.

• عيون الحرباء تتحرك بشكل منفصل في اتجاهات مختلفة.
• عين تبحث عن الفريسة والعين الأخرى لتجنب الخطر.

It has a V-shaped feet and a tail like a hand.

- To hold tightly on the branches of trees.

• لها أقدام تشبه حرف (v) وذيل يشبه اليد للتمسك بقوة بأفروع الأشجار.

Behavioral adaptation:

In danger, it scares its attacker by:

- 1 Puffing up its body with air.
- 2 Opening its mouth wide.
- 3 Changing the color of its scales.

• عندما تشعر بالخطورة فإنها تخيف أعداءها؛ حيث تقوم بـ:
- نفخ جسمها بالهواء. - فتح فمها واسعًا. - تغيير لون الحراشف.



NOTE:

- The panther chameleon doesn't have **teeth** or **claws** for defense.

لا تمتلك حرياء النمر أسناناً أو مخالب للدفاع عن نفسها.

Comparison between panther chameleon and desert lizard:

Starred Agama Lizard



Panther Chameleon



Habitat:

Very hot and dry desert

Tropical rainforests

Similarity:

Both lizards are **reptiles** covered with **scales**.



Check your understanding?

» **Classify the following adaptations of a panther chameleon into the following table:**

V-shaped feet - Changing scales' color - Puffing up its body - Brightly colored scales - Opening its mouth wide - Hand-like tail

Structural Adaptations	Behavioral Adaptations

Lesson Two

Part (A)

Answered

1 Choose the correct answer:

1.  is a behavioral adaptation that helps an animal protect itself from enemies. (Dakahlia 2025)

- (a) Migration (b) Extinction (c) Camouflage (d) Reproduction

2. Which of the following is an example for a structural adaptation?

- (a) Migration of birds. (b) Hunting at night.
(c) Fur color. (d) Panting.

3. The color of fur of fennec fox protects it from (Alex. 2025)

- (a) wind (b) rains (c) hot climate (d) cold weather

4. pant to lower their body temperature. (Cairo 2022)

- (a) Whales (b) Penguins (c) Foxes (d) Bats

5. Animals that live in a hot environment have ears to help them get rid of the excessive body temperature. (Cairo 2025)

- (a) small (b) short (c) sharp (d) long

6. is (are) covering the body of the Arctic fox. (Cairo – Suez 2023)

- (a) Heavy hair (b) Heavy skin (c) Thick fur (d) Many feathers

7. All the following properties help arctic fox to stay warm, except (Qena 2022)

- (a) short legs (b) tan-colored fur
(c) short ears (d) thick fur color

8. The color of the polar bear's fur helps it blend in with the

- (a) rocks (b) snow (c) trees (d) sand

9.  Bull sharks can live in (Suez 2023)

- (a) fresh water only (b) seas and mud
(c) rivers, seas, and oceans (d) salt water only

10. Panting in fennec foxes belong to adaptation(s). (Menofia 2023)

- (a) structural (b) behavior
(c) both behavioral and structural (d) neither structural nor behavioral

11. The extra-large of a fennec fox allow(s) heat to escape from its body.
 (a) fur (b) face (c) ears (d) eyes (Alex. 2023)
12.  is considered a behavioral adaptation in the panther chameleon.
 (a) The V-shaped feet (b) Puffing up its body during danger
 (c) Moving each eye independently (d) Tail like a hand (Giza 2023)
13. The panther chameleon uses its like a hand. (Damnhour 2023)
 (a) eyes (b) tail (c) head (d) ears
14. Panther chameleon may be found in the same habitat of (Menofia 2023)
 (a) polar bears (b) brown bears (c) fennec foxes (d) agama lizards
15. Bull sharks use a strategy called to sneak up on their prey.
 (a) migration (b) echolocation (c) panting (d) countershading
16.  A panther chameleon changes its color to blend with the surrounding environment, this is known as
 (a) echolocation (b) respiration (c) camouflage (d) digestion

2 Put (✓) or (X):

1. Adaptation is necessary for the survival of all living organisms. ()
-  2. The migration of birds to search for food is considered a behavioral adaptation. (Giza 2022) ()
-  3. Foxes have a strong sense of hearing. (Rea Sea 2022) ()
-  4. Some animals that live in cold habitats have long ears. (Sharkia 2022) ()
5. The ears of arctic fox are larger than those of fennec fox. (Sohag 2023) ()
6. The fennec fox pants like dogs to stay warm at night. ()
7. Countershading strategy is a structural adaptation. ()
8. All types of sharks live in salt water only. ()
9. Fennec fox has sandy-colored fur to make camouflage. (Beni-Suef 2024) ()
10. The sharp teeth of a bull shark are considered a behavioral adaptation. ()
11. A panther chameleon uses its claws and teeth to scare its enemies. ()
12. The panther chameleon's eyes can search for prey and watch out for enemies at the same time. ()

3 Write the scientific term:

1. It is a change in the behavior or acts of a living organism to adapt to its environment. (.....)
2.  It is a change in the structure of an animal's body to help it to survive. (.....)
3. It is a type of foxes that changes its fur color between winter and summer seasons. (Alex. 2024) (.....)
4. It is a strategy of camouflage in which the animal's color is darker on its top, and lighter on its belly. (.....)
5. It is a type of fox that have tan-colored fur. (Behiera 2023) (.....)
6. It is a place where both Arctic foxes and fennec foxes hide to overcome the extreme climate. (.....)

4 Cross out the odd word:

1. Penguin – Polar bear – Snake – Arctic fox (Alex. 2025) (.....)
2. Fennec fox – Starred agama lizard – Panther chameleon – Bull shark (Alex. 2024) (.....)

5 Complete the following using the words between the brackets:

(arctic fox – air – structural – behavioral –
independently – bull shark – fennec fox)

1. The panther chameleon puffing up its body with is considered a adaptation. (Cairo - Giza 2023)
2. A/An has a countershading property to sneak up on its prey in water.
3. The stays in burrows at night, while the stays in burrows during day.
4. The eyes of a panther chameleon move and that is considered adaptation. (Behira 2022)

6 Compare between the following:

P. O. C.	Fennec Fox	Arctic Fox
Habitat		
Fur Color		
Size of Ears		

7 Choose from column (A) what suits it in both columns (B) & (C):

Column (A)	Column (B)	Column (C)
1. Fennec fox	Ⓐ has sharp teeth	Ⓐ to hold on branches of trees.
2. Arctic fox	Ⓑ pants like dogs	Ⓑ to warm its body.
3. Panther chameleon	Ⓒ has V-shaped feet	Ⓒ to tear the prey's flesh.
4. Bull shark	Ⓓ has short ears	Ⓓ to cool its body.

1. → 2. → 3. → 4. →

8 Classify the following sentences by putting the letter (S) for structural adaptations and the letter (B) for behavioral adaptations:

- The panther chameleon puffs its body with air. (Beni Suif 2023) ()
- Birds migrate to search for food. (Qalyubia 2023) ()
- The tan-colored fur of the fennec fox. (Port Said 2023) ()
- Bull shark has a varied diet. ()
- Weaving the blood vessels in penguin's feet. (Assiut 2023) ()
- Starred agama lizard looks for shade. ()
- The bull shark can survive in salt and fresh water. ()
- Fennec fox pants like a dog. (Matrouh 2025) ()
- Fennec fox has long ears. (Cairo 2025) ()
- Thick, white fur in the polar bear. (Dakahlia 2025) ()
- Fennec fox lives in burrows. (Dakahlia 2025) ()
- Panther chameleon has V-shaped feet. ()

9 Give a reason for:

1.  The fennec fox has extra-large ears, while the Arctic fox has small ears.

(Menofia 2023)

2. The fennec fox pants like a dog.

(Cairo 2024)

3. The body of a chameleon is covered with colored scales.

(Alex. 2023)

4. The bull shark has a dark back and a white belly.

5.  In fresh water, a bull shark finds less competition in finding food.

6.  Each eye of the panther chameleon moves independently.

7.  Panther chameleon has V-shaped feet and a long tail.

(Assiut 2023)

8. Panther chameleon puffs its body with air and opens its mouth widely.

9. The fur color of the Arctic fox changes through the seasons.

10. Arctic fox has a thick fur coat.

(Damitta 2024)

11. The fennec fox and arctic fox eat different types of food.

(Cairo 2025)

10 What happens if:

1. A panther chameleon stands on the green leaf of a tree?

2. The fur of the Arctic fox stays white during summer?

3. The bull shark has a dark belly and a white back?

4. Panther chameleon is exposed to danger?

5.  Fennec fox has short ears?

(Giza 2025)

6.  The Arctic fox doesn't have thick fur?

7.  The panther chameleon has no V-shaped feet?

12 Give an example of structural adaptations in each of the following animals:

1. Polar bear:

2. Panther chameleon:

13 Give an example of behavioral adaptations in each of the following animals:

1. Bull shark:

(Gharbia 2024)

2.  Fennec fox:

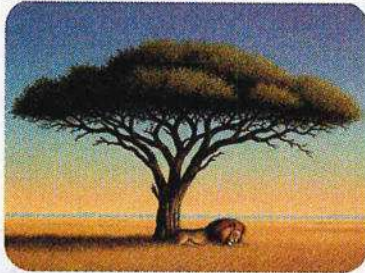
Activity 6 Plant Adaptations

- » Plants can grow **everywhere** that sunlight shines.
- » Plants have **structural** and **behavioral** adaptations to survive in different environments.

We will study two forests with different conditions which are:

Savannah

in Southern Africa



Soil conditions

It is a grassland habitat.

هي أرض عشبية.

Climate

It has a mild temperature.

درجة حرارتها معتدلة.

Availability of Water

There is a **lack** of water and drought conditions.

هناك نقص شديد في المياه وموجات من الجفاف.

Acacia Trees

أشجار السنط

Amazon rainforests

in Brazil



It has soggy soil.

تربته طينية.

It characterized by the strong winds.

تتميز برياحها القوية.

There is a **plenty** of water because it is rainy most of the year.

هناك وفرة في المياه لسقوط الأمطار طوال العام.

Kapok Trees

أشجار الكابوك

1

Acacia Trees

A big tree grows in **savannah**.



Umbrella-shaped tree

Structural adaptation:

1 Roots:

- It has very long roots grow **downward** called **taproot**. **G.R**
To search for water deep in the soil.

• لديها جذر وتدي (جذور طويلة تنمو لأسفل) للبحث عن المياه في أعماق التربة.



Taproot



- Taproot roots may reach **35 meters** below the soil.

2 Trunk:

- It has a very long trunk, so most animals, except giraffes, can't reach its leaves.
• لديها جذع طويل؛ حيث لا تستطيع معظم الحيوانات الوصول لأوراقها إلا الزرافة.
- It stores water in its trunk like camel stores fat in its hump.
• تخزن الماء في جذعها، كما يخزن الجمل الدهون في سنامها.



3 Leaves:

- It has tiny leaves on its top. **G.R**
To hold water and soak up sunlight to make food.
• لها أوراق صغيرة جدًا؛ لمساعدتها على الاحتفاظ بالمياه وامتصاص الضوء لصنع الغذاء.
- It has sharp spines around the leaves. **G.R**
To prevent animals from eating its leaves.
• لها أشواك حادة حول الأوراق؛ لمنع الحيوانات من أكل أوراقها.



Behavioral adaptation:

What happens if:

- A giraffe starts to eat the leaves of an acacia tree?
 - The acacia tree can defend itself, as follows:

1

It produces a poison that makes the leaves taste very bad.



2

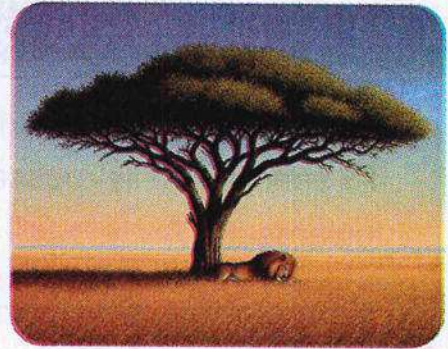
It sends smelly messages through the wind to the nearby acacia trees to alert them to start making the same poison.

- تقوم شجرة السنط بالدفاع عن نفسها عندما تبدأ الزرافة في أكل أوراقها.
- تقوم بإفراز سُم يجعل طعم الأوراق سيئًا جدًا.
- ترسل رسائل كريهة الرائحة؛ لتحفز باقي شجر السنط على إفراز نفس السُم.

Give a reason for:

- Large plants, except acacia trees, can't grow in savannah.
 - Due to the dry season lasts for half of the year and there is no rain.

• لا تنمو أغلب النباتات الكبيرة عدا أشجار السنط في السافانا، بسبب فصول الجفاف التي تستمر لنصف العام، حيث لا يسقط المطر إطلاقًا.



2

Kapok Trees

A big tree grows in **amazon rainforest**.



Umbrella-shaped tree

Structural adaptation:

1 Roots:

- It has **buttress roots** grow up on its trunk. **(G.R)**

To fix the tree firmly in the soggy soil.

• تنمو الجذور الداعمة لدى شجرة الكابوك لأعلى حول جذعها؛ لتثبيت الشجرة بقوة في التربة الطينية.



Buttress roots

2 Leaves:

- It has **hand-shaped leaves** with narrow parts. **(G.R)**

To allow the wind to move gently through the leaves without cutting them.

• لها أوراق على شكل كف اليد؛ لتسمح للرياح بالتحرك خلالها دون أن تتمزق.



Hand-shaped leaves

3 Seeds:

- It has **fluffy, yellow** seeds. **(G.R)**

To be carried easily by the wind across the forest.

• لها بذور صفراء رقيقة؛ لتقوم الرياح بحملها نحو الغابة.



Zooming on yellow fluffy seeds

Behavioral adaptation:

- It spreads its delicious-smelling flowers. **(G.R)**

To send a smelly message through the wind to attract bats towards it.

• تقوم بنشر عبير أزهارها لترسل رسائل عبر الرياح لجذب الخفافيش إليها.



Give a reason for:

- In Amazon rainforests, it is hard for plants to reach sunlight.

– Because most trees in Amazon rainforests exceed 70 meters tall.

• من الصعب على النباتات الوصول لضوء الشمس في غابات الأمازون المطيرة؛ حيث يتخطى طول معظم الأشجار 70 متراً.

Activity 7 Plant Scientist

» **Botanists** are the scientists who study **plants** and how they adapt.

» Plants have different properties that help them survive.

• للنباتات خصائص مختلفة؛ لمساعدتها في البقاء على قيد الحياة.

• علماء النبات هم العلماء الذين يدرسون النباتات وكيفية تكيفها.

Examples of Plants Structural Adaptations:

Palm tree

Habitat: Desert

- It has a thick trunk and narrow leaves. **G.R**
To resist strong wind.

• لها جذع سميك وأوراق صغيرة لتساعد الشجرة على الصمود أمام الرياح.

- Its leaves are covered with waxy layer. **G.R**
To protect it from extreme hot weather.

• لها أوراق مغطاة بطبقة شمعية لحمايتها من شدة حرارة الطقس.



Barbary fig

Habitat: Desert

- It has sharp spines and a tough outer cover. **G.R**
To prevent animals from eating its leaves and fruits.

• لها أشواك حادة وغطاء خارجي خشن لمنع الحيوانات من أكل أوراقها وثمارها.



Acacia tree

Habitat: Savannah

- Its branches are bunched at the top of the tree. **G.R**
To prevent animals from reaching them.

• الأغصان متفرعة ومتشعبة في الجزء العلوي من الشجرة لمنع الحيوانات من الوصول إليها.



Water lily

Habitat: Wetland
(Fresh water)

- It has wide leaves floating on the water. **G.R**

To absorb a large amount of sunlight.

• لها أوراق عريضة تطفو على سطح الماء لامتصاص أكبر كمية من ضوء الشمس.



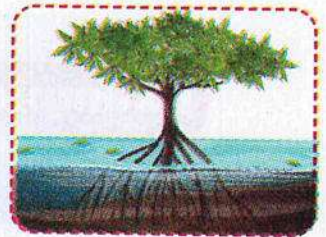
Mangrove tree

Habitat: Salt water

- It has long and strong roots. **G.R**

To resist the water waves.

• لها جذور طويلة وقوية لمقاومة الأمواج.



Pine tree

Habitat: Snow

- It has needles instead of leaves. **G.R**

To prevent water loss.

• تحتوي على إبر بدلاً من الأوراق لمنع فقدان الماء.

- It has a triangular shape, and short branches. **G.R**

To allow snow to slide easily on the branches without breaking them.

• لها شكل مثلث وفروع قصيرة للسماح للثلج بالانزلاق بسهولة دون كسر الفروع.



What happens if:

- A plant was moved to a another different environment?

– The plant may die or may adapt the new environment to survive.



Check your understanding?

» Put (✓) or (X):

- 1 Barbary figs keep animals away from them by producing poison. ()
- 2 Pine trees have needles instead of leaves. ()
- 3 It is hard for small plants in rainforests to reach sunlight. ()
- 4 Acacia trees and kapok trees use wind to send smelly messages. ()

Lesson Two

Part (B)

Answered

1 Choose the correct answer:

1. Both acacia trees and kapok trees have the same (Kafir El-Shaikh 2023)
 (a) habitat (b) shape (c) roots (d) trunk
2.  One of the behavioral adaptations of acacia tree is that (Alex. 2023)
 (a) its very long roots (b) it produces a poison
 (c) its very tall trunk (d) it has sharp spines
3. The umbrella-shaped trees are and (Cairo 2023)
 (a) mangrove trees – kapok trees (b) acacia trees – kapok trees
 (c) mangrove trees – acacia trees (d) barbary figs – water lilies
4. The keep(s) animals away from acacia trees.
 (a) spines (b) poison (c) long trunks (d) all the previous
5. A is the only animal that can eat some leaves of an acacia tree.
 (a) penguin (b) giraffe (c) tiger (d) deer
6.  tree grow in salt water. (Port Said 2025)
 (a) Kapok (b) Palm (c) Mangrove (d) Acacia
7. The acacia tree stores in its
 (a) fat – trunk (b) poison – leaves
 (c) water – roots (d) water – trunk
8. The kapok tree uses wind to
 (a) carry its fluffy seeds (b) send a message to bats
 (c) catch sunlight (d) a and b
9.  A Barbary fig has to prevent animals from eating it.
 (a) long roots (b) sharp spines (c) thick trunk (d) colored leaves
10. The buttress roots of the tree support its
 (a) acacia tree – trunk (b) kapok tree – leaves
 (c) kapok tree – trunk (d) acacia tree – branches
11. One of the structural adaptations of the water lily plant is that it has
 (a) long roots (b) wide leaves
 (c) tiny leaves (d) sharp spines (Giza 2023)

12. Mangrove trees have long roots to (Sharkia 2023)
- (a) resist strong wind (b) resist water waves
(c) absorb underground water (d) prevent water loss
13. Both and have sharp spines to keep animals away.
- (a) acacia trees – kapok trees (b) kapok trees – barbary figs
(c) barbary figs – acacia trees (d) water lilies – mangrove trees
14. All the following organisms are adapted to survive in an extreme cold environment, except
- (a) pine trees (b) palm trees (c) polar bears (d) Arctic foxes
15. Both bull sharks and can survive in salt water.
- (a) water lilies (b) acacia trees (c) barbary figs (d) mangrove trees
16. The may feed on the roots of a barbary fig.
- (a) panther chameleon (b) Arctic fox
(c) fennec fox (d) polar bear
17. All the following properties protect acacia tree leaves from being eaten by animals, except that (Minia 2022)
- (a) they are very high enough (b) they are surrounded by sharp spines
(c) they produce a poison (d) they are brightly colored
18.  The leaves in the tree change into needles to prevent it from losing water.
- (a) acacia (b) kapok (c) pine (d) mangrove
19.  grow in the desert.
- (a) Acacia trees (b) Palm trees (c) Water lilies (d) Mangrove trees
20.  Plants that have small leaves and thorns live in the
- (a) deserts (b) tropical rainforests
(c) large intestine (d) saltwater

2 Put (✓) or (X):

1. Desert plants are characterized by their big leaves. (Port Said 2023) ()
2. Palm trees have thick trunks and narrow leaves. (Dakahlia 2023) ()
3. Plants have only structural adaptations that help them survive in different environments. (Fayoum 2023) ()

4. Acacia trees grow in the Amazon forest. (Alex. 2023) ()
5. Hand-shaped leaves in the kapok tree are considered a behavioral adaptation. (Minia 2023) ()
6.  Buttress roots of kapok trees grow upward. ()
7. Animals can't eat Barbary fig due to its sharp spines. (Damitta 2024) ()
8. The taproot hold the kapok tree firmly in the soggy soil. ()
9. It is difficult for rainforest plants to get water. ()
10. Both acacia trees and kapok trees use wind to send smelly messages. ()
11. Kapok trees have delicious-smelling flowers to keep bats away. ()
12. Both mangrove trees and water lilies grow in fresh water. ()
13. A pine tree has needles instead of leaves to prevent water loss. (Giza 2023) ()
14. Pine trees have short branches to let snow slide down. ()
15. A water lily has wide leaves to absorb big amounts of water. ()
16. One of the structural adaptations of acacia tree is that it has long roots called buttress roots. (Sohag 2023) ()

3 Write the scientific term:

1. He is the scientist who studies plants. ()
2. It is a habitat that is characterized by its strong wind and soggy soil. ()
3. It is a grassland habitat in Southern Africa that has drought conditions. ()
4.  They are trees that grow in Amazon rainforest. (Alex. 2025) ()
5. It is a terrific tree that is adapted to survive in savannah grasslands. ()
6. It is the type of adaptation when a kapok tree sends smelly messages by wind. ()
7. It is a part of the kapok tree that is supported by buttress roots. ()
8. It is a substance that is produced by an acacia tree to prevent animals from eating its leaves. ()

9. It is a structural adaptation surrounding the leaves of acacia trees and is also found in barbary figs. (.....)
10. It is a structural adaptation in palm trees that holds them steady against windstorms. (.....)
11. It is a plant that is adapted to survive in snow and has a triangular shape. (.....)
12. It is a plant that has wide leaves floating on the water to absorb sunlight. (.....)
13. It is a tree that grown in salt water and has strong and long roots. (.....)
14. It is a part of pine trees that prevents water loss. (.....)

4 Complete the following sentences:

1.  help the kapok tree to hold in the soggy soil.
2. The hand-shaped leaves of tree to allow to flow through them gently. (Gharbia 2023)
3. Drought regions are characterized by lacking of so their plants adapt by having very long (Gharbia 2024)
4. The structural adaptation of tree can resist water waves, while the structural adaptation of tree can resist strong wind. (Giza 2024)
5. The water lily has leaves to absorb a large amount of
6. The acacia tree stores in its trunk, while the camel stores in its hump.
7. Kapok tree spreads the smell of its flowers to attract toward it. (Alex. 2024)

5 Cross out the odd word:

1. Palm tree – Barbary fig – Acacia tree – Kapok tree (.....)
2. Barbary fig – Palm tree – Polar bear – Fennec fox (.....)
3. Pine tree – Penguin – Acacia tree – Polar bear (Menofia 2024) (.....)

6 Compare between the following:

1

P. O. C.	Kapok Tree	Acacia Tree
Habitat		
Types of Roots		
Shape of Leaves		

2

P. O. C.	Water Lily	Pine Tree	Palm Tree
Habitat			
Shape of Leaves			

7 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Water lily	Ⓐ can survive in salt water.
2. Mangrove tree	Ⓑ can survive in fresh water.
3. Bull shark	Ⓒ can survive in the desert.
4. Barbary fig	Ⓓ can survive in salt and fresh water.

1. 2. 3. 4.

8 Study the following figures, then complete the sentences below:



Figure (1)



Figure (2)



Figure (3)



Figure (4)

1. The tree in figure (.....) has a triangular shape.
2. The tree in figure (.....) grows in the same habitat of a panther chameleon.
3. The tree in figure (.....) has buttress roots, while the tree in figure (.....) has taproot roots.
4. The tree in figure (.....) has narrow leaves and a thick trunk to resist

9 Give a reason for:

1. The acacia tree has taproot roots, while the kapok tree has buttress roots.
.....
2. The acacia tree sharp spines around its leaves. (Alex. 2024)
.....
3. The kapok tree has hand-shaped leaves.
.....
4.  The palm tree has a thick trunk and narrow leaves.
.....
5. Barbary figs have sharp spines. (Sharkia 2022)
.....
6.  The water lily has wide, floating leaves. (Sharkia 2023)
.....
7. Mangrove trees have long, strong roots. (Cairo 2023)
.....
8.  The pine tree has a triangular shape and short branches.
.....
9. Acacia tree has very long trunk. (Giza 2025)
.....

10.  Animals don't eat acacia trees' leaves.

.....

11.  Kapok tree stay upright in the soggy soil.

.....

10 What happens if:

1. Acacia trees have short roots?

.....

2. A barbary fig leaves don't have any spines?

.....

3. A giraffe starts to eat from the acacia leaves?

.....

(Alex. 2023)

4. A kapok tree has wide leaves?

.....

5. The kapok tree has a short trunk?

.....

6. The water lily has narrow leaves?

.....

7. A pine tree has an umbrella shape?

.....

8.  A plant was transferred from its environment to another?

.....

9.  Palm trees have no thick and strong roots?

.....

10.  Acacia trees don't produce a poison?

.....

11 Mention an example for:

(a) A behavioral adaptation in acacia trees.

.....

(b) A behavioral adaptation in kapok trees.

.....

(c) A structural adaption in water lilies.

.....

Lesson

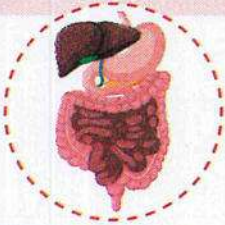
3

Part (A)

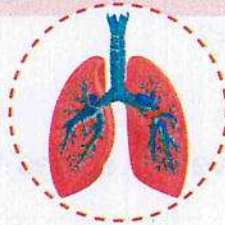
Activity 8 Digestive System

» The body of humans or animals is made up of systems, such as:

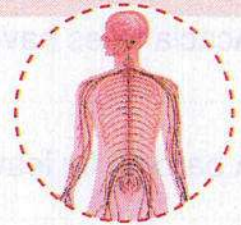
Digestive System



Respiratory System



Nervous System



System

It is a group of **organs** that work together to perform a specific **job (function)**.

الجهاز: هو مجموعة من الأعضاء تعمل معًا لأداء وظيفة.

» The **digestive system** and **respiratory system** work together to get energy from **food** and **breathing**.

• يعمل الجهاز الهضمي والجهاز التنفسي معًا: للحصول على الطاقة من الطعام والتنفس.

Our bodies need energy to:

Do different activities:

- To move, run, walk, talk,...etc.

Perform functions inside the body:

- 1 The **heart** needs energy to **beat**.
- 2 The **lungs** need energy to **breathe**.
- 3 The **brain** needs energy to **think**.

Scientific Facts

Our heart beats = 100,000 times/day.

We breathe = 20,000 times/day.

How do our bodies get energy from food?

- 1 The digestive system helps our body get nutrients from food.
- 2 Nutrients provide our body with energy.

كيف تحصل أجسامنا على الطاقة من الغذاء؟

• تُزوّد العناصر الغذائية الجسم بالطاقة.

• يساعد الجهاز الهضمي أجسامنا في الحصول على العناصر الغذائية من الطعام.

Human Digestive System

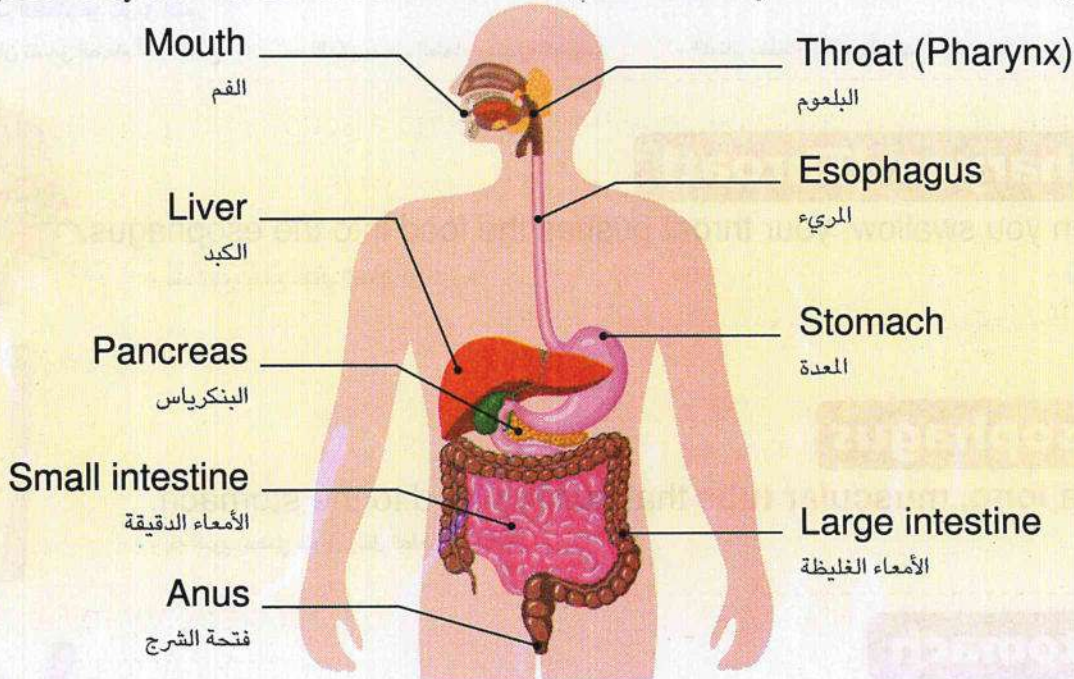
Digestion

It is the process of breaking down food into smaller pieces to provide the body with nutrients.

الهضم: هو عملية تكسير الطعام إلى أبسط صورة لتزويد الجسم بالعناصر الغذائية.

Function of the Digestive System

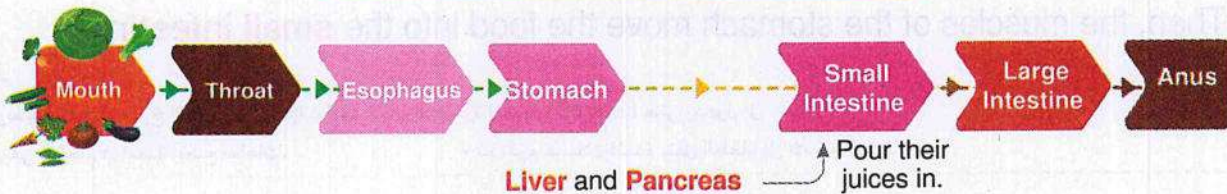
The digestive system **breaks down** the food, so the body can use it for energy.



NOTE:

- The digestive system starts with the **mouth** and ends with the **anus**.

Digestion Process Pathway



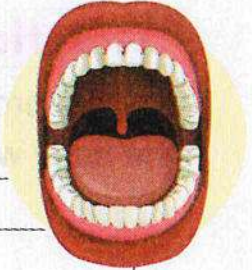
How does the digestive system work?

1 Mouth

- The digestion of food starts in the **mouth**.

It contains:

- | | |
|---------------|---|
| Teeth | • They crush (break) the food during chewing. |
| Saliva | • It is a liquid substance that moistens the food.
• It breaks down the food chemically . |
| Tongue | • It mixes the crushed food with saliva. |

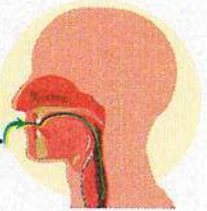


- يبدأ هضم الطعام عن طريق الفم.
- الأسنان تسحق الطعام أثناء المضغ.
- اللعاب يربط الطعام ويكسره كيميائياً.
- اللسان يخلط الطعام باللعاب.

2 Pharynx (Throat)

- When you swallow, your throat pushes the food into the esophagus.

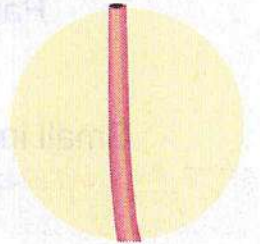
- عند البلع، يدفع حلقك الطعام إلى المريء.



3 Esophagus

- It is a **long, muscular tube** that pushes food to the stomach.

- إنه أنبوب عضلي طويل ينقل الطعام إلى المعدة.



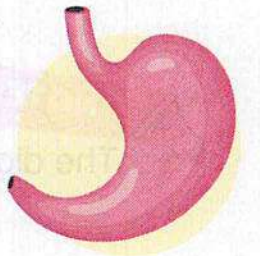
4 Stomach

- It is a **muscular organ**.

Function of the stomach:

The stomach mixes the food with the acidic digestive juices and enzymes until it becomes a **soupy liquid**.

- The food stays in the stomach for a **few hours**.
- Then, the muscles of the stomach move the food into the **small intestine**.



- هي عضو عضلي.
- وظيفة المعدة: تمزج الطعام بالعصارات الحمضية والعصارة المعدية (الإنزيمات) حتى يتحول إلى سائل.
- يبقى الطعام في المعدة لبضع ساعات.
- ثم تقوم عضلات المعدة بنقل الطعام إلى الأمعاء الدقيقة.

5 Small Intestine

- It's a **long, winding tube**. (More than **six meters** long)

Function of the liver and pancreas:

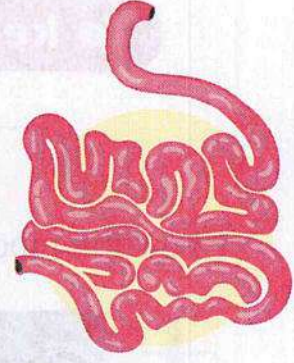
They pour juices into the small intestine that help break down food into **nutrients**.

Function of the small intestine:

The nutrients are absorbed through the walls of the small intestine to enter into the tiny blood vessels.

Then:

- The **digested food (nutrients)** is carried by the **blood** to all body parts.
- The **undigested food** flows into the **large intestine**.



- هي أنبوب طويل ملتف (يزيد طوله على ستة أمتار).
- وظيفة الكبد والبنكرياس: ينتجان في الأمعاء الدقيقة عصارات تساعد في تكسير الطعام إلى عناصر غذائية.
- وظيفة الأمعاء الدقيقة: تمتص العناصر الغذائية من خلال جدران الأمعاء الدقيقة لتدخل في الأوعية الدموية الدقيقة.
- يحمل الدم العناصر الغذائية إلى جميع أجزاء الجسم.
- ثم تصل المواد غير المهضومة إلى الأمعاء الغليظة.

6 Large Intestine

- It's a **wide tube** that starts at the end of the small intestine and ends with the anus.

Function of the large intestine:

- It absorbs **water** from the undigested food so that it becomes solid waste.
- Solid waste leaves the body through the **anus**.



- هي أنبوب يبدأ من نهاية الأمعاء الدقيقة وينتهي بفتحة الشرج.
- وظيفة الأمعاء الغليظة:
- تمتص الماء من الطعام غير المهضوم فيتحول إلى فضلات صلبة.
- تخرج الفضلات الصلبة من الجسم عبر فتحة الشرج.

To keep your digestive system healthy:

1

Chew the food well.



2

Do not eat many fast meals.



3

Drink a large amount of water.



- Chewing food breaks it up **mechanically**.
- Saliva breaks down the food **chemically**.



Check your understanding?

» Use the following sentences to complete the table below:

It absorbs nutrients. – It absorbs water. – It is a muscular organ. –
It is a long, winding tube. – No digestion happens in it. – Digestion ends in it. –
It changes food into a soupy liquid. – It ends with the anus.

Stomach	Small Intestine	Large Intestine

Lesson Three

Part (A)

Answered

1 Choose the correct answer:

1. Any system inside the body consists of a group of
 (a) cells (b) tissues (c) organs (d) roots
2.  An organ which mixes food with saliva and crushes it with the teeth is the
 (a) stomach (b) mouth (c) small intestine (d) pharynx
3. All the following are organs of the digestive system, except the
 (a) mouth (b) lungs (c) stomach (d) esophagus
 (Suez 2024)
4. The mouth contains all the following, except the
 (a) throat (b) saliva (c) tongue (d) teeth
5. Crushing the food is the function of
 (a) teeth (b) saliva (c) stomach (d) tongue
 (Behira 2022)
6.  Digestion process begins in the
 (a) stomach (b) mouth
 (c) liver (d) small intestine
 (Alex. & Giza 2023)
7. In the mouth, moistens the food.
 (a) acid (b) saliva (c) the liver (d) the pancreas
8. passes the food from pharynx to stomach.
 (a) Stomach (b) Esophagus (c) Trachea (d) Alveoli
 (Cairo - Dakahlia 2025)
9. The stomach is a part of the digestive system that
 (a) chews food
 (b) converts food into a soupy liquid form
 (c) absorbs nutrients from food
 (d) delivers food into the esophagus
 (Alex. & Oalyubia 2022)
10. In the stomach, digestion of food occurs with the help of the
 (a) Pepsi (b) saliva
 (c) stomach acid only (d) enzymes and stomach acid
11. The length of the small intestine is more than meters.
 (a) 10 (b) 20 (c) 6 (d) 12

12. The is the longest organ in the digestive system that looks like a winding tube.
 (a) stomach (b) esophagus (c) small intestine (d) tongue
13. The and secrete their juices in the small intestine to help break down the food into nutrients.
 (a) pancreas – stomach (b) stomach – liver
 (c) mouth – liver (d) pancreas – liver
14. When you take a bite of a sandwich, what is the correct pathway through which food passes?
 (a) Mouth → Stomach → Esophagus → Small intestine
 (b) Mouth → Esophagus → Small intestine → Stomach
 (c) Nose → Esophagus → Small intestine → Stomach
 (d) Mouth → Esophagus → Stomach → Small intestine
15. The process of absorption of nutrients occurs in the
 (a) stomach (b) small intestine (c) large intestine (d) mouth
16.  An organ that stores undigested food and expels it out from the body is the
 (a) esophagus (b) large intestines (c) stomach (d) small intestines
17.  Nutrients are carried by the from the wall of the to all body parts.
 (a) liver – small intestine (b) blood – large intestine
 (c) blood – small intestine (d) liver – large intestine
18.  The undigested food passes from the small intestine into the
 (a) blood (b) liver (c) large intestine (d) pancreas (Suez 2022)
19.  The long, winding tube whose length is more than 6 meters is called the
 (a) small intestine (b) esophagus (c) large intestine (d) stomach (Suez 2023)
20. The large intestine absorbs from the undigested food.
 (a) fats (b) water (c) nutrients (d) proteins

2 Put (✓) or (X):

1. Each organ inside the human body consists of a group of systems. ()
2.  Food turns from a complex form into a simpler one during digestion. (Cairo 2022) ()
3.  During swallowing, food is pushed by the pharynx directly to the stomach. (Alex. 2022) ()
4. The stomach is a long muscular tube. ()
5. Food remains in the stomach for a few days before turning into a soupy liquid form. ()
6.  Digestion of food begins in the stomach by the help of saliva. (Giza 2023) ()
7.  The food passes from the mouth to the stomach through a narrow tube known as the small intestine. (Qena 2022) ()
8.  The food passes through the large intestine before it goes into the small intestine. (Sohag 2022) ()
9. Both the liver and pancreas secrete their juices in the stomach. ()
10. The large intestine starts from the end of the small intestine. ()
11. Nutrients are absorbed in the small intestine, while water is absorbed from the undigested food in the large intestine. ()
12. You should chew food well before swallowing it. ()
13. Eating too much fast food makes your digestive system unhealthy. ()

3 Write the scientific term:

1. It is the process of breaking down food into small pieces to let the body cells get nutrients from them. (Cairo 2023) (.....)
2. It is the system that breaks food into small parts to get energy. (Alex. 2022) (.....)
3. It is the organ where digestion of food begins. (.....)
4. It is a liquid found in the mouth that facilitates the swallowing of food. (Giza 2022) (.....)

5.  It is a long muscular tube that moves the food into the stomach.

(Damanhur 2022) (.....)

6. It is a muscular organ where food stays for a few hours to turn into a soupy liquid form. (.....)

7. It is a long, winding tube that receives food from the stomach. (.....)

8. It is the organ in which the absorption of digested food occurs. (.....)

9. It is the organ in which water is absorbed from the undigested food. (.....)

10.  It is an organ through which solid waste leaves the body.

(Luxor 2023) (.....)

4 Complete the following sentences:

1. The digestive system ends with the

2. The moistens the food, while the crush food to be mushy and soft.

3. The wall of the small intestine contains tiny that absorb nutrients to be transferred to the blood stream.

4. In the digestive system, the lies between the pharynx and stomach.

5. In the digestive system, intestine absorbs the nutrients through its walls, while intestine absorbs water from the undigested food.

(Behira 2024)

6. The organ that breaks down food into nutrients is (Cairo 2025)

7.  pushes the food to the stomach.

5 Cross out the odd word:

1.  Saliva – Stomach – Esophagus – Small intestine

(Azhar 2023) (.....)

2. Nose – Esophagus – Mouth – Stomach (.....)

3. Stomach – Large intestine – Esophagus – Liver (.....)

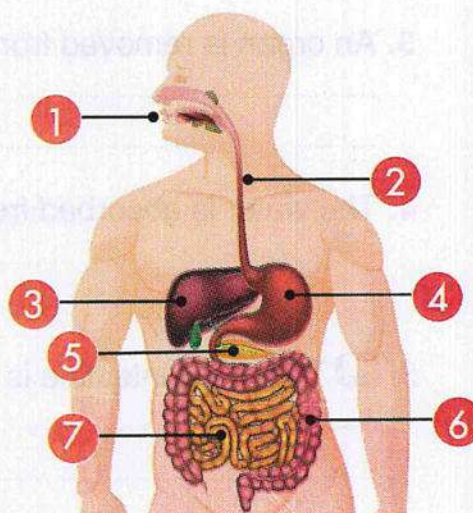
6 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Esophagus	(a) helps the body to get rid of solid waste.
2. Teeth	(b) completes the digestion of food and absorbs the nutrients.
3. Anus	(c) is a muscular organ where an acid and digestive juices are secreted.
4. Small intestine	(d) pushes the food down into the stomach.
5. Large intestine	(e) starts from the end of the small intestine and ends with the anus.
6. Stomach	(f) break and crush food during chewing.

1. 2. 3. 4. 5. 6.

7 Label the following figure:

1.
2.
3.
4.
5.
6.
7.



8 Give a reason for:

1. The digestive system has a great importance.

.....

2. Saliva has an important function in the digestion of food.

.....

3. The pancreas and liver help in the digestion process.

4. You shouldn't eat too much fast food.

9 What happens if:

1.  Saliva isn't secreted inside the mouth?

2.  Humans don't chew the food?

3. An organ is removed from the digestive system?

4. The water is absorbed from the undigested food in the large intestine?

5.  The small intestine is not part of the digestive system?

Lesson

3

Part (B)

Activity 9 Respiratory System

» Choose the correct answer:

1. The human body needs an invisible gas called to survive.

carbon dioxide

oxygen

2. Your breath quickens during because your body needs more air.

thinking

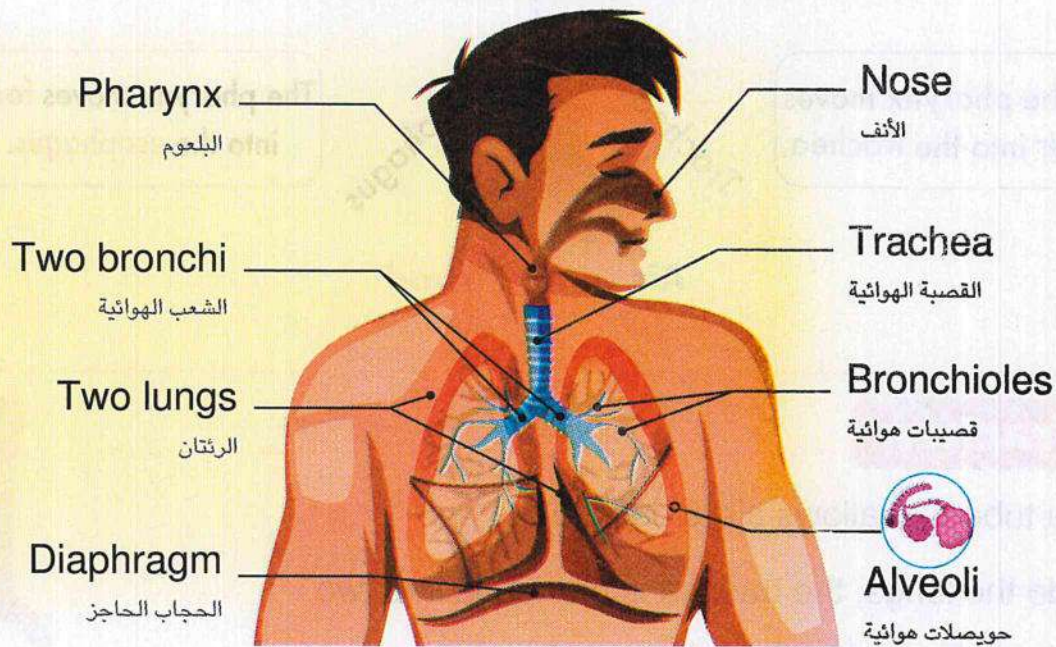
running

Respiratory system

It is the system that is responsible for breathing (respiration).

الجهاز التنفسي: هو الجهاز المسئول عن عملية التنفس.

Human Respiratory System



Respiration Pathway

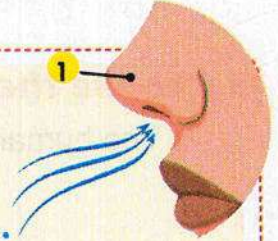


How does the respiratory system work?

1 Nose

- The nose is the **first organ** of the respiratory system.
- Air enters the body through the **nose** and **mouth**.

• هو أول عضو في الجهاز التنفسي. • يدخل الهواء الجسم عن طريق الأنف والفم.



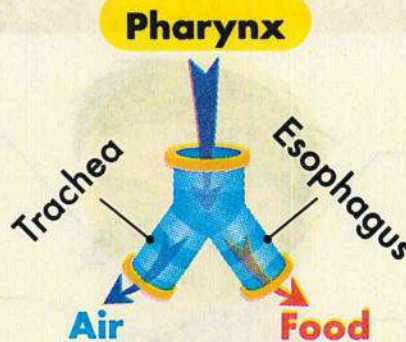
2 Throat (Pharynx)

- It exists in the **digestive** and **respiratory** systems.
- It is a common path for **food** and **air**.

• يوجد في كل من الجهاز الهضمي والجهاز التنفسي.

• يعتبر مسارًا مشتركًا للطعام والهواء.

The pharynx moves **air** into the **trachea**.



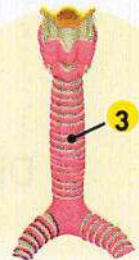
The pharynx moves **food** into the **esophagus**.

3 Trachea

- It is a tube that allows air to pass to the **two lungs**.
- Inside the lungs, the trachea is branched into two smaller tubes called "**two bronchi**".

• أنبوب يسمح للهواء بالمرور إلى الرئتين.

• داخل الرئة تتفرع القصبة الهوائية إلى أنبوبتين أصغر تُسميان «الشعبتين الهوائيتين».

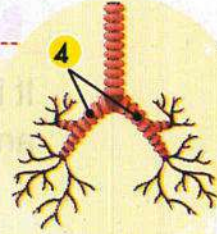


4 Two Bronchi

- They allow air to enter the **two lungs**.
- They are divided into smaller tubes that look like trees' branches, called **bronchioles**.

• تنقسم كل منهما إلى أنابيب أصغر تشبه فروع الشجرة تُسمى «القصبية الهوائية».

• تسمحان للهواء بالدخول إلى الرئتين.



5 Two Lungs

- They fill up with air like **two balloons**.

Inside the two lungs:

Bronchioles end with tiny air sacs surrounded by blood vessels called **alveoli**.

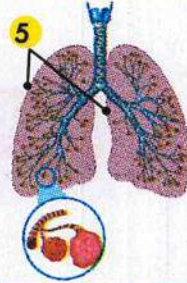
Inside the blood vessels:

Oxygen moves into the blood, which carries oxygen to all body parts.

• عندما ينتقل الهواء إلى الرئتين، فإنهما تنتفخان مثل البالون.

• تنتهي الشعبات الهوائية بأكياس صغيرة محاطة بالأوعية الدموية تُسمى «الحويصلات الهوائية».

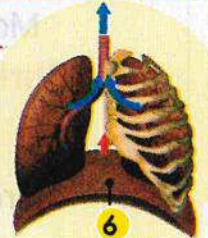
• ينتقل الأكسجين من خلال مجرى الدم الذي ينقل غاز الأكسجين إلى جميع أجزاء الجسم.



6 Diaphragm

- It is a **large muscle** at the base of the ribs that has an important role during inhalation and exhalation.

• عضلة كبيرة في أسفل (قاعدة) الضلوع، لها دور مهم أثناء عمليتي الشهيق والزفير.



NOTE:

- The properties (functions) of all organs in the digestive system or respiratory system are considered **structural adaptations**.
- We can't store extra oxygen in our body, so we must constantly take in new oxygen gas.

• جميع الخصائص (الوظائف) داخل الجهاز الهضمي أو الجهاز التنفسي تعتبر تكيفات تركيبية.

• لا يمكننا تخزين الأكسجين الزائد في أجسامنا؛ لذلك علينا أن نحصل على غاز الأكسجين الجديد باستمرار.

Respiration process

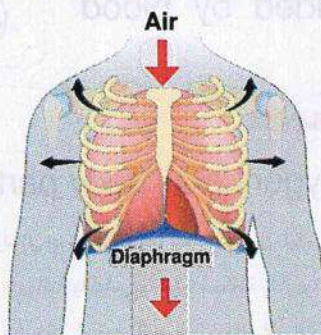
It is the process of pulling air into the body (**inhalation**) and pushing air out of the body (**exhalation**).

هي عملية سحب الهواء داخل الجسم (الشهيق) ودفع الهواء خارج الجسم (الزفير).

Respiration includes:

Inhalation Process

"Pulling the air in"



Diaphragm

Moves **downward**
(**Shrinks** or **contracts**).

Chest Size

Increases (Enlarges).

Type of Air

Air rich in **oxygen gas**
enters the lungs.

Pathway of Air

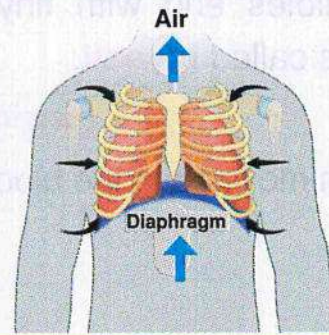
Nose → Pharynx → Trachea → Lungs

في عملية الشهيق:

- يتحرك الحجاب الحاجز لأسفل (ينكمش).
- ويتسع القفص الصدري لإدخال الهواء الغني بالأكسجين إلى الرئتين.

Exhalation Process

"Pushing the air out"



Moves **up**
(**Relaxes** or **expands**).

Decreases (Becomes narrower).

Air rich in **carbon dioxide gas**
is expelled out the lungs.

Lungs → Trachea → Pharynx → Nose

في عملية الزفير:

- يتحرك الحجاب الحاجز لأعلى (يتمدد).
- ويضيق القفص الصدري لإخراج ثاني أكسيد الكربون من الرئتين.

Functions of the respiratory system:

1

It supplies the body with **oxygen gas** through the **inhalation** process.

2

It gets rid of **carbon dioxide gas** through the **exhalation** process.

How does the respiratory system get oxygen to the body cells?

- 1 The lungs absorb oxygen from the air that we breathe in.
- 2 The blood stream carries oxygen gas to all body cells.

To keep your respiratory system healthy:

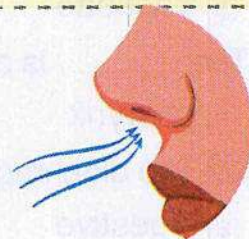
Avoid smoking.



Eat fruits rich in vitamin C.



Breathe in clean air.



Check your understanding?

» Put (✓) or (X):

- 1 Carbon dioxide is considered a waste material during respiration. ()
- 2 The diaphragm contracts during exhalation. ()
- 3 The air travels to the lungs through the esophagus. ()
- 4 The bronchioles look like the branches of trees. ()

Lesson Three

Part (B)

Answered

1 Choose the correct answer:

1. The is the only external organ of the respiratory system.
 (a) trachea (b) nose (c) lungs (d) pharynx
2. All the following organs belong to the respiratory system, except the
 (a) nose (b) stomach (c) lung (d) trachea
3.  Which organ exists in both the digestive and respiratory systems? (Cairo 2023)
 (a) Esophagus. (b) Trachea. (c) Pharynx. (d) Lungs.
4. In the respiratory system, the lie(s) between the throat and lungs.
 (a) trachea (b) esophagus (c) nose (d) alveoli
5. is the tube that delivers air to your lungs.
 (a) Nose (b) Esophagus (c) Trachea (d) Air sac
6. In the lungs, the two bronchi are divided into smaller tubes called
 (a) bronchioles (b) alveoli (c) trachea (d) blood vessels
7. In the lungs, the are tiny air sacs at the end of the bronchioles.
 (a) tracheae (b) blood vessels (c) bronchi (d) alveoli
8. The is a muscle that helps in inhalation and exhalation processes.
 (a) pharynx (b) alveoli (c) diaphragm (d) liver
9.  The diaphragm is an important muscle in the system.
 (a) digestive (b) nervous (c) urinary (d) respiratory
10. Air passes through all the following organs, except the
 (a) trachea (b) diaphragm (c) nose (d) pharynx
11.  Carbon dioxide is a gas to the body if we don't get rid of it.
 (a) beneficial (b) useful (c) harmful (d) a and c
12. The process involves pulling air in and pushing air out of the body.
 (a) exhalation (b) digestion (c) inhalation (d) respiration
13. During exhaling, the diaphragm
 (a) contracts and moves upward (b) expands and moves upward
 (c) expands and moves downward (d) contracts and moves downward

14. The passage of air during the inhalation process is:
- (a) Nose → Trachea → Pharynx → Lungs
 - (b) Nose → Lungs → Throat → Trachea
 - (c) Lungs → Trachea → Pharynx → Nose
 - (d) Nose → Pharynx → Trachea → Lungs
15. During inhalation, the diaphragm and the chest size
- (a) contracts – decreases
 - (b) relaxes – increases
 - (c) contracts – increases
 - (d) relaxes – decreases
16. When air is pushed OUT of the lungs, what is the correct pathway for carbon dioxide gas?
- (a) Nose → Pharynx → Trachea → Lungs
 - (b) Nose → Trachea → Pharynx → Lungs
 - (c) Lungs → Pharynx → Trachea → Nose
 - (d) Lungs → Trachea → Pharynx → Nose

2 Put (✓) or (X):

1. Small intestine is from the important organ in the respiratory system. ()
(Matrouh 2025)
2. The esophagus precedes the trachea in the respiratory system. ()
3. The diaphragm is a bone that helps in inhalation and exhalation processes. ()
4.  The lungs exist inside your chest cavity. ()
5. In the lungs, the alveoli are surrounded by bronchioles. ()
6. Carbon dioxide gas is expelled from the body during inhalation. ()
7. When the diaphragm contracts, carbon dioxide gas is expelled outside the body. ()
8. The respiratory system is responsible for the entry of air into the body. ()
(Fayoum 2023)
9. The exhaled air is loaded with oxygen. ()
(Alex. 2022)
10.  During exhalation, the diaphragm expands. ()
(Sohag 2022)
11. The inhaled air is rich in oxygen gas. ()
(Azhar 2023)
12. The diaphragm contracts and moves upward during inhalation. ()
(Menofia 2023)

3 Write the scientific term:

1.  It is the system responsible for getting rid of harmful air from the body. (.....)
2. It is a harmful gas produced from the respiration process and must be expelled outside the body. (.....)
3. It is an organ that allows air to pass from the nose to the trachea. (Alex. 2023) (.....)
4.  It is an organ in humans that work to extract oxygen from the air. (.....)
5. It is a muscle that contract and relax in respiration process. (Cairo 2025) (.....)
6. They are smaller branches of the bronchi. (.....)
7. Little air sacs surrounded by blood vessels in the respiratory system. (Behira 2024) (.....)

4 Complete the following sentences:

1.  The muscle that helps in respiration process is the
2. Air enters and exits the human body through the system. (Cairo 2022)
3. During inhalation, the air travels down from your throat to your lungs through the (Giza 2023)
4. In the lungs, bronchi are branched into smaller tubes called
5. Oxygen is transferred from the air into the blood through air sacs called that are surrounded by
6.  During exhalation, gas is released, while during inhalation, gas is taken in.
7.  The diaphragm moves upward during and downward during
8.  is a common organ in both digestive system and respiratory system.

5 Correct the underlined words:

1. During exhalation, oxygen gas comes out of the lungs. (.....)
2. The lungs are one of the important organs in the digestive system. (.....)
3. The diaphragm rises up during the inhalation process. (.....)
4. During exhalation, the diaphragm muscle contracts. (.....)
5. Exhale air carries oxygen gas. (Dakahlia 2025) (.....)

6 Cross out the odd word:

1. Nose – Trachea – Stomach – Lungs (Alex. 2023) (.....)
2. Trachea – Lungs – Diaphragm – Throat (.....)
3. Bronchi – Bronchioles – Alveoli – Trachea (.....)
4. Stomach – Lung – Mouth – Large intestine (Alex. 2025) (.....)

7 Compare between the following:

Respiratory System	Inhalation	Exhalation
Diaphragm		
Chest Size		
Air Rich in		

8 Choose from column (A) what suits it in column (B):

(Giza 2022)

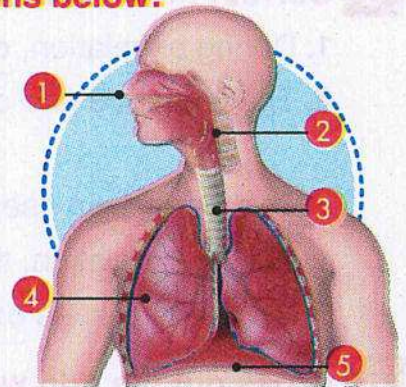
Column (A)	Column (B)
1. It is a common organ between the digestive and respiratory systems.	(a) Carbon dioxide gas
2. It is a gas necessary for the respiration process.	(b) Respiration
3. It is the process of pushing air into the body and outside it.	(c) Diaphragm
4. It is an important muscle in the respiration process.	(d) Throat (Pharynx)
5. It is the gas produced from the respiration process.	(e) Oxygen gas

1. 2. 3. 4. 5.

9 Study the following figure, then answer the questions below:

A Label the opposite figure:

1. 2.
3. 4.
5.



B Mention the number of the organ that:

1. Is a pathway for both food and air. (.....)
2. Contains alveoli. (.....)

C What happens to organ number 5 during the inhalation process?

.....

10 Give a reason for:

1. In the lungs, the alveoli are surrounded by blood vessels.

2. The inhaled air differs from the exhaled air. (Suez 2023)

3. The diaphragm has an important role in the respiration process.

4. The diaphragm muscle expands and moves up during the exhalation process.

5. We should avoid smoking and eat fruits rich in vitamin C.

11 What happens if:

1. The diaphragm moves upward during the exhalation process? (Minia 2023)

2. The diaphragm moves downward during the inhalation process? (Damnhour 2023)

3. You stop breathing for a long time? (Damnhour 2023)

Lesson

4

Activity 10 How Fish Breathe

» Tick (✓) the right answer:

• Both humans and fish

☐ live on land ☐ live in water

☐ inhale oxygen ☐ exhale oxygen

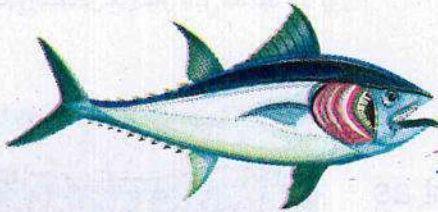


Differences Between Humans and Fish:

Fish

Fish have gills (G.R)

To inhale oxygen gas from **water**.



للسمكة خياشيم لاستخلاص الأكسجين من الماء.

Humans

Humans have two lungs (G.R)

To inhale oxygen gas from **air**.



للإنسان رئتان لاستخلاص الأكسجين من الهواء.

Similarities Between Humans and Fish:

- Both of them take in **oxygen gas** and release **carbon dioxide gas**.
- **Blood** carries **oxygen gas** to all body parts.

• يقوم الدم بنقل غاز الأكسجين لجميع أجزاء الجسم.

• كلاهما يستنشق غاز الأكسجين ويُخرج ثاني أكسيد الكربون.

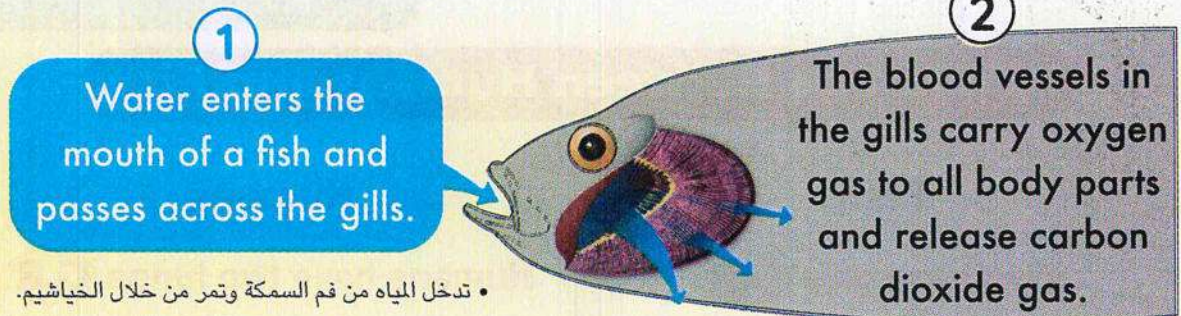
Structural Adaptation in Fish:

- » Fish have **gills** (unique structures) to allow them to breathe underwater.
- » Gills are found on both sides of a **fish's head**.
- » Fish use gills to take the **oxygen gas** dissolved in water and release **carbon dioxide gas**.

• تمتلك الأسماك خياشيم؛ لتساعد على التنفس تحت الماء.

• تستخدم السمكة الخياشيم للحصول على غاز الأكسجين الذائب في الماء وطردها غاز ثاني أكسيد الكربون.

How do fish breathe in water?



• تدخل المياه من فم السمكة وتمر من خلال الخياشيم.

• تقوم الأوعية الدموية بحمل الأكسجين إلى جميع أجزاء الجسم والتخلص من غاز ثاني أكسيد الكربون.



NOTE:

- Fish need clean water to survive, just as humans need clean air to breathe.

• يحتاج السمك إلى ماء نظيف للبقاء، كما يحتاج الإنسان إلى هواء نقي للتنفس.



Check your understanding?

» Put (✓) or (X):

- 1 Lungs in humans and gills in fish are structural adaptations. ()
- 2 Water pollution impacts fish and humans. ()

Activity 11 Humans Change the Environment

» Human activities can change an ecosystem.

» Living organisms must adapt to any change in the ecosystem to survive.

• قد تتسبب الأنشطة البشرية في تغيير النظام البيئي.

• للبقاء على قيد الحياة يجب على الكائنات الحية أن تتكيف مع أي تغيرات تحدث في البيئة.

Examples of Some Human Activities:

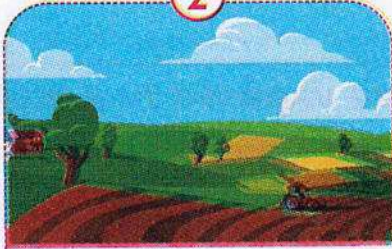
1



Cutting down forests

قطع الأشجار في الغابات.

2



Plowing grasslands
(Clearing lands)

تجريف التربة.

3



Building communities

بناء المدن على الأرض الزراعية.

4



Air pollution is
caused by:

- a. Cars exhausts.
- b. Factory pollution.

تلوث الهواء؛ بسبب عوادم السيارات
والمصانع.

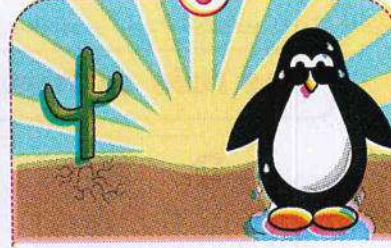
5



Water pollution or
soil pollution is
caused by:
Dumping waste into
waterways or soil.

تلوث المياه أو تلوث التربة؛ بسبب إلقاء
النفايات في المجاري المائية أو التربة.

6



Introducing plants
and animals to an
ecosystem that they
were never a part of.

وضع حيوانات أو نباتات في بيئة
مختلفة عن بيئتها الأصلية.

When the air, water, or soil in an area is polluted:

- Some animals can survive by moving to another ecosystem.
 - Plants must rely on their seeds to land in a better place to survive.
- يمكن لبعض الحيوانات البقاء على قيد الحياة بالانتقال إلى نظام بيئي آخر. • تعتمد النباتات على بذورها لتستقر في مكان أفضل للبقاء على قيد الحياة.

Humans are also affected by pollution, as:

- 1 **Air pollution (smog)** makes it hard for humans to breathe.
- 2 **Water pollution** makes it hard for humans to find clean drinking water.
- 3 **Soil pollution** makes crops hard to grow.

• تلوث الهواء يؤدي إلى صعوبة التنفس للإنسان. • تلوث الماء يؤدي إلى عدم وجود مياه شرب نظيفة. • تلوث التربة يؤدي إلى عدم نمو المحاصيل.

People living in cities are exposed to a high level of air pollution for long periods of time, so they will suffer from:



• يتعرض الأشخاص الذين يعيشون في المدن لمستويات عالية من تلوث الهواء لفترات طويلة من الزمن، مما يؤدي إلى معاناتهم من تدمير الرئتين والربو والأمراض القلبية.

The role of human to help restore the ecosystem:



Check your understanding?

» Put (✓) or (X):

- 1 Plants and animals can be affected by human activities. ()
- 2 Humans can restore the ecosystem. ()

Lesson Four

Answered

1 Choose the correct answer:

1.  Fish breathe oxygen gas dissolved in water by (Cairo 2025)
 (a) skin (b) gills (c) lungs (d) fins
2.  In fish, the carry oxygen to the rest of the body.
 (a) lungs (b) gills (c) blood vessels (d) tails
3. As fish need clean water to breathe, humans need to drink.
 (a) clear air (b) polluted air (c) clean water (d) polluted water
4. Both humans and fish to survive.
 (a) need clean water to breathe (b) inhale oxygen gas
 (c) inhale carbon dioxide gas (d) exhale oxygen gas
5.  Gills are found on both sides of a the of the fish.
 (a) tail (b) eye (c) head (d) fin
6.  destroys the lungs and causes many diseases.
 (a) Respiration (b) Nutrition (c) Pollution (d) Digestion
7. pollution makes it hard for humans to breathe.
 (a) Air (b) Water (c) Soil (d) Noise
8. The negative effects of human activities on the human health include (Qalyubia 2022)
 (a) lungs damage and asthma (b) asthma and wounds
 (c) wounds (d) lungs damage and wounds

2 Put (✓) or (x):

1. Fish breathe through the lungs. (Cairo 2025) ()
2. Fish use their gills to take carbon dioxide gas dissolved in the water. ()
3. Both humans and fish need clean water to survive. ()
4. The exhaled air contains more oxygen gas. ()
5. Asthma is caused by water pollution. ()
6.  Humans cannot restore the ecosystem in any way. (Cairo 2022) ()
7. People living in big cities are exposed to a high level of air pollution. ()

8. Human activities may cause air, water, and soil pollution. ()
9. Cutting down forests can cause environmental changes. ()
10. Burning forests is one of the positive human activities on the environment. ()

3 Cross out the odd word:

1. Lungs – Alveoli – Gills – Diaphragm (Alex. 2023) (.....)
2. Lung damage – Asthma – Headache – Heart problems (.....)

4 Write the scientific term:

1. They are the organs that help humans respire oxygen gas from the air. (.....)
2. They are special organs in fish that allow them to extract the oxygen dissolved in water and remove carbon dioxide. (.....)
3. It is a pollution caused by the exhausts of cars and factories. (.....)
4. It is a gas presents in air and water, and is very important for breathing. (Behlra 2022) (.....)
5. It is a gas released from the gills of fish into the water. (.....)

5 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Lungs	Ⓐ is carried by blood to all body parts.
2. Gills	Ⓑ carries oxygen to all body parts of the fish.
3. Blood	Ⓒ is exhaled by humans and animals.
4. Oxygen gas	Ⓓ allow humans to extract oxygen from the air.
5. Carbon dioxide gas	Ⓔ allow fish to survive underwater.

1. 2. 3. 4. 5.

6 Give a reason for:

1. Gills are unique structural adaptation in fish. (Cairo 2023)

2.  Fish die when they leave the water.

.....

3.  Humans and fish are similar in some characteristics.

.....

4.  Humans must replace forests that they cut.

.....

5. Some people in big cities suffer from asthma or lung damage.

.....

7 What happens if:

1.  Human lungs are replaced by gills?

.....

(Port Said 2025)

2. Car and factories exhausts level increases in a city
(Concerning the impact on human health)?

.....

3. People cut down forests and plow grasslands?

.....

4. Many communities are built and agriculture is neglected?

.....

8 Mention an example for:

Ⓐ A human activity that negatively affect the water.

.....

.....

Ⓑ A human activity that negatively affect the air.

.....

.....

Ⓒ A human activity that negatively affect the soil.

.....

.....

Lesson

5

Activity 12 Record Evidence Like a Scientist

- » You have learned a lot about adaptations in living organisms.
- » Now, act like a scientist and try to answer the following question.



Question:

- » How do different types of animals and plants adapt to survive in extreme climates?



My Claim:



Evidence:



Scientific Explanation with Reasoning:

Activity 13 Function and Adaptation

» In this lesson, we will study **amphibians** and how they adapt to their environment.

Amphibians

They are small animals that live **in water** and **on land**.

Habitat: Moist environment (rainforests – streams – ponds)

تعيش في البيئات الرطبة (الغابات المطيرة – مجاري المياه – البرك).

Frogs



Toads



Salamanders



Structural Adaptations in Amphibians

» Amphibians are covered with **skin** that water and gases can pass through.

• يغطي البرمائيات جلدٌ يمكن أن يمر من خلاله الماء والغازات.

On Land

» Adult amphibians inhale oxygen gas from the air through their **lungs** (like human).

• تستطيع البرمائيات استخلاص الأكسجين من خلال الرئتين كالإنسان.

In Water

» They can extract oxygen gas from the water using their **skin**.

• تستطيع أيضًا استخلاص الأكسجين من المياه عن طريق الجلد.

» Amphibians need clean water to stay healthy.

» Amphibians are very sensitive to any environmental pollution, such as:

- ① Air pollution
- ② Water pollution
- ③ Viruses in water

• تحتاج البرمائيات إلى مياه نظيفة لتظل بصحة جيدة.

• البرمائيات حساسة للغاية لأي تلوث بيئي، مثل: ① تلوث الهواء. ② تلوث الماء. ③ الفيروسات في المياه.

90 species

of amphibians have become extinct in the last 20 years.

90 فصيلة انقرضت آخر 20 عامًا.

124 species

of amphibians are endangered.

124 فصيلة معرضة للانقراض.

Extinction

It is the continuous decrease in the number of individuals of an organism until the death of all its members.

الانقراض: هو التناقص المستمر في أعداد الكائنات الحية حتى تموت جميعها.

The Role of Scientists to Protect Amphibians from Extinction

Scientists are working to save amphibians from extinction by studying:

- How amphibians adapt and interact with their environment.
- What makes amphibians sick in their environment.



• يعمل العلماء على حماية البرمائيات من الانقراض عن طريق دراسة:

• كيفية تكيف وتفاعل البرمائيات مع البيئة المحيطة. • ما يصيب البرمائيات بالضعف في بيئتها.

The Role of People in Protecting Amphibians from Extinction

- 1 Avoid throwing waste materials into the water.
- 2 Getting rid of the chemicals in a correct way to avoid water pollution.

• حماية البرمائيات من الانقراض:

2 التخلص من الكيماويات بطريقة صحيحة لتجنب تلوث المياه.

1 تجنب إلقاء المخلفات في المياه.



Check your understanding?

» Put (✓) or (X):

- 1 Amphibians can take in oxygen gas from the air and water. ()
- 2 Frogs cannot survive in drought conditions. ()

Lesson Five

Answered

1 Choose the correct answer:

1.  need clean water to survive.
 - (a) Humans only
 - (b) Fish only
 - (c) Amphibians only
 - (d) Humans, fish, and amphibians
2.  Frogs can extract from the water through their
 - (a) oxygen – lungs
 - (b) carbon dioxide – gills
 - (c) oxygen – skin
 - (d) carbon dioxide - skin
3.  Both and live in wetland habitats.
 - (a) frogs – palm trees
 - (b) fennec foxes – frogs
 - (c) water lilies – frogs
 - (d) Arctic foxes – salamanders
4. The species that are no longer exist anywhere on Earth are called species.
 - (a) surviving
 - (b) endangered
 - (c) extinct
 - (d) living
5. Frogs, toads and salamanders belong to
 - (a) reptiles
 - (b) birds
 - (c) mammals
 - (d) amphibians
6. Both and can survive on land.
 - (a) fish – humans
 - (b) frogs – humans
 - (c) frogs – fish
 - (d) fish – birds
7. Frogs, fish, and humans
 - (a) extract oxygen gas from water
 - (b) can respire through their lungs
 - (c) can respire through their skin
 - (d) inhale oxygen gas

2 Put (✓) or (X):

1.  Amphibians use their gills to breathe in water. ()
2. Frogs and toads are from the reptiles that live in moist environment. ()
3. Adult frogs can breathe through the lungs. ()
4. Air and water pollution threatens the amphibians survival. ()

5.  We must get rid of chemicals in the correct way instead of throwing them into waterways to avoid water pollution. ()
6. The number of amphibians in a pond decreases when the water pollution in the pond increases. ()
7. Amphibians are very sensitive to any environmental pollution. ()
8. The Egyptian frog lives in ponds and streams. ()

3 Complete the following sentences:

1. Animals that can live both in water and on land are called
2. Amphibians breathe using their and
3. have two breathing methods.
4. On land, a toad uses its to get oxygen gas from the
5. Fish use their to get oxygen gas from the
6. is a reptile that can be found at the same habitat of frogs.

4 Cross out the odd word:

1. Frogs – Salamanders – Fish – Toads (.....)
2. Bull sharks – Fish – Frogs – Humans (.....)

5 Write the scientific term:

1. They are species of living organisms that can live on land and in water.
(Alex. 2024) (.....)
-  2. It is the gas in air and water that living organisms breathe in during respiration.
(Cairo 2022) (.....)
3. It is an organ through which amphibians extract oxygen gas from water.
(.....)
4. It is an organ that allows frogs to breathe on land. (.....)
5. It is the continuous decrease in the number of individuals of an organism until the death of all its members. (.....)

6 Give a reason for:

1. Scientists learn a lot about how amphibians adapt.

.....

.....

2.  Amphibians can live both in water and on land.

.....

.....

3. Amphibians can't survive in a grassland habitat.

.....

.....

7 What happens if:

1. Frogs have gills instead of lungs?

.....

.....

2. The water pollution level increases in a lake that contains some amphibians?

.....

.....

8 Explain how amphibians adapt to the environment.

.....

.....

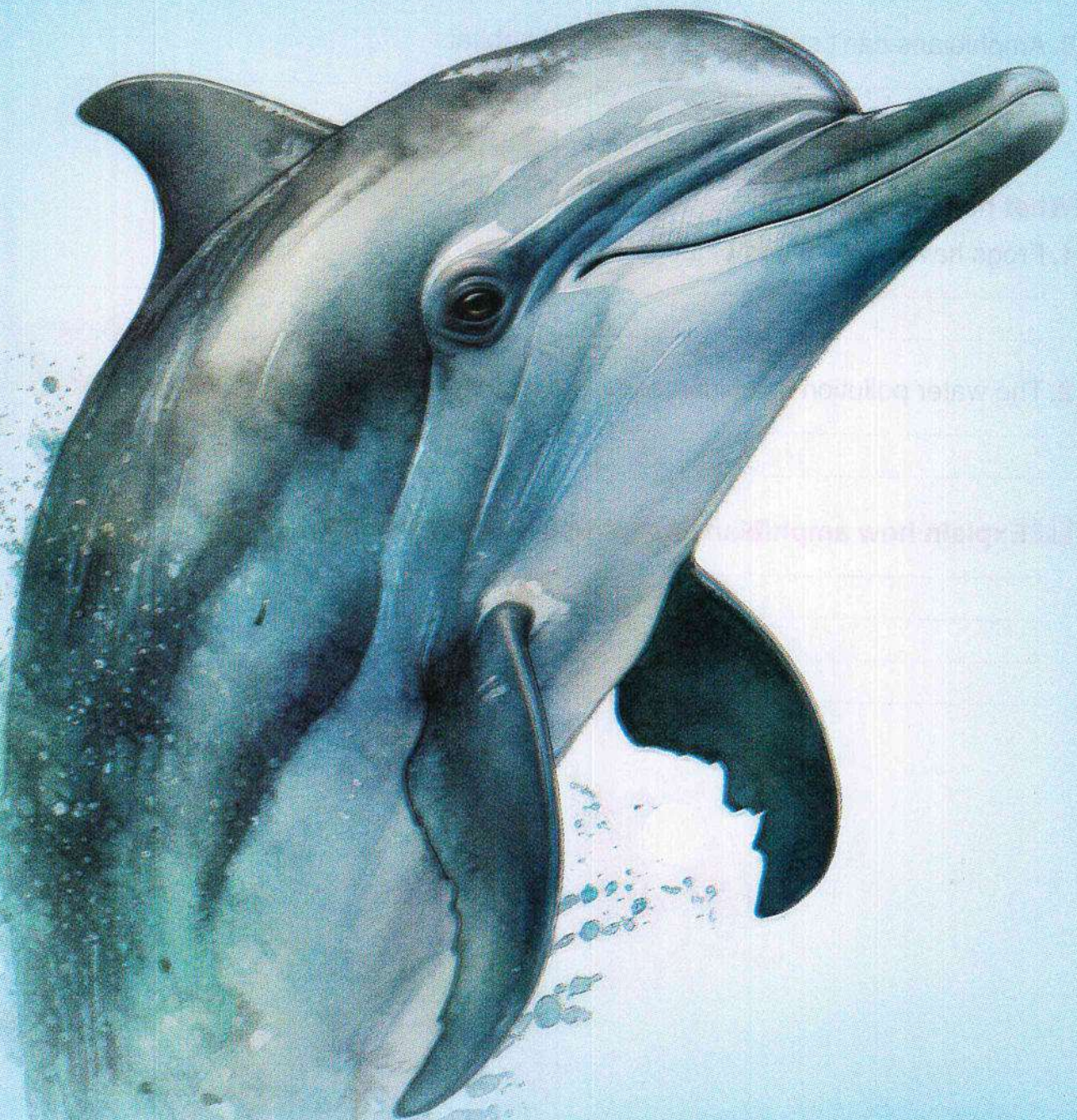
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Concept

1.2

Senses at Work



Concept 2

Senses at Work

Lesson 1

- | | |
|------------|--|
| Activity 1 | Can You Explain? |
| Activity 2 | Dolphin Senses |
| Activity 3 | What Do You Already Know About Senses at Work? |

Lesson 2

- | | |
|------------|-----------------------------|
| Activity 4 | Senses of Nocturnal Animals |
| Activity 5 | The Nervous System |
| Activity 6 | Sensing the Environment |

Lesson 3

- | | |
|------------|-------------------------------|
| Activity 7 | How the Nervous System Works |
| Activity 8 | Describing the Nervous System |

Lesson 4

- | | |
|-------------|---------------------------------------|
| Activity 9 | How Animals Use Communication Systems |
| Activity 10 | Technology Inspired by Nature |

Glossary

Lesson (1)

Activity (1)

Sensory organs	أعضاء الحواس	Senses	الحواس	Hearing	حاسة السمع	Ears	الأذنان
Sight	حاسة البصر	Eyes	العيان	Smell	حاسة الشم	Nose	الأنف
Taste	حاسة الذوق	Tongue	اللسان	Touch	حاسة اللمس	Skin	الجلد
Environment	البيئة	Communicate	يتواصل	Egyptian mongoose	النمس المصري	Chatter	الثرثرة
Sensation	الإحساس	Spoiled milk	لبن فاسد				

Activity (2)

Dolphin	الدولفين	Super senses	حواس خارقة	Echolocation	تحديد الموقع بالصدى	Echo	صدى الصوت
Sound waves	موجات الصوت	Solid object	جسم صلب	Reflection (bouncing)	انعكاس	Source	مصدر

Activity (3)

Avoid	يتجنب	Recognize	يتعرف على				
-------	-------	-----------	-----------	--	--	--	--

Lesson (2)

Activity (4)

Nocturnal animals	حيوانات ليلية	Nervous system	الجهاز العصبي	Owl	البومة	Bat	الخفاش
Jerboa	اليربوع	Surprise	يفاجئ	Darkness	الظلام	Mammals	الثدييات
Tiny	ضئيلة	Extraordinary	خارقة	Rotate (Turn)	تدور	Bowl-shaped face	وجه يشبه الوعاء

Activity (5)

Brain	المخ	Control center	مركز التحكم	Spinal cord	النخاع الشوكي	Backbone	العمود الفقري
Nerves	الأعصاب	Distributed	متفرع	Vice versa	العكس صحيح	Sensory receptors	مستقبلات
Rodents	القوارض	Sensory organs	أعضاء حسية	Translates	يترجم	Respond	استجابة
Message	رسائل	Sensitive	حساس				

Activity (6)

Hind legs	أرجل خلفية	Zigzag paths	مسارات متعرجة	Toes	أصابع القدم	Jump (Hop)	يقفز
Grip (Catch)	يتمسك	Reaction time	زمن الاستجابة	Spines	أشواك	Cactus plant	نبات الصبار

Lesson (3)

Activity (7)

Gather	يجمع	Process	يعالج	Chirp	يفرد	Reflexes	ردود الفعل المنعكسة
Blinking	إغماض العينين	Automatically	تلقائيًا	Receive	يستلم	Muscles	عضلات

Activity (8)

Translate	يترجم	Signal	إشارة	Interpret	يفسر		
-----------	-------	--------	-------	-----------	------	--	--

Lesson (4)

Activity (9)

Written symbols	رموز مكتوبة	Email	البريد الإلكتروني	Humpback whales	الحيتان الحدباء	Sound pitch	حدة الصوت
Rough voice	صوت خشن	Sharp voice	صوت حاد	Tones	نغمات	Series of songs	سلسلة من الأغاني
Mating season	موسم التزاوج	Feeding season	موسم الغذاء	Ants	النمل	Colonies	مستعمرات
Different roles	أدوار مختلفة	Developed	طورت	Individuals	أفراد	Nurse ants	عاملات النمل
Scout ants	النمل الكشاف	Solider ants	جنود النمل				

Activity (10)

Blind person	الشخص الكفيف	Cane	عكاز طبي	Pick up	يلتقط	Vibrations	اهتزازات
Alert	ينبه	Danger nearby	خطر قريب				

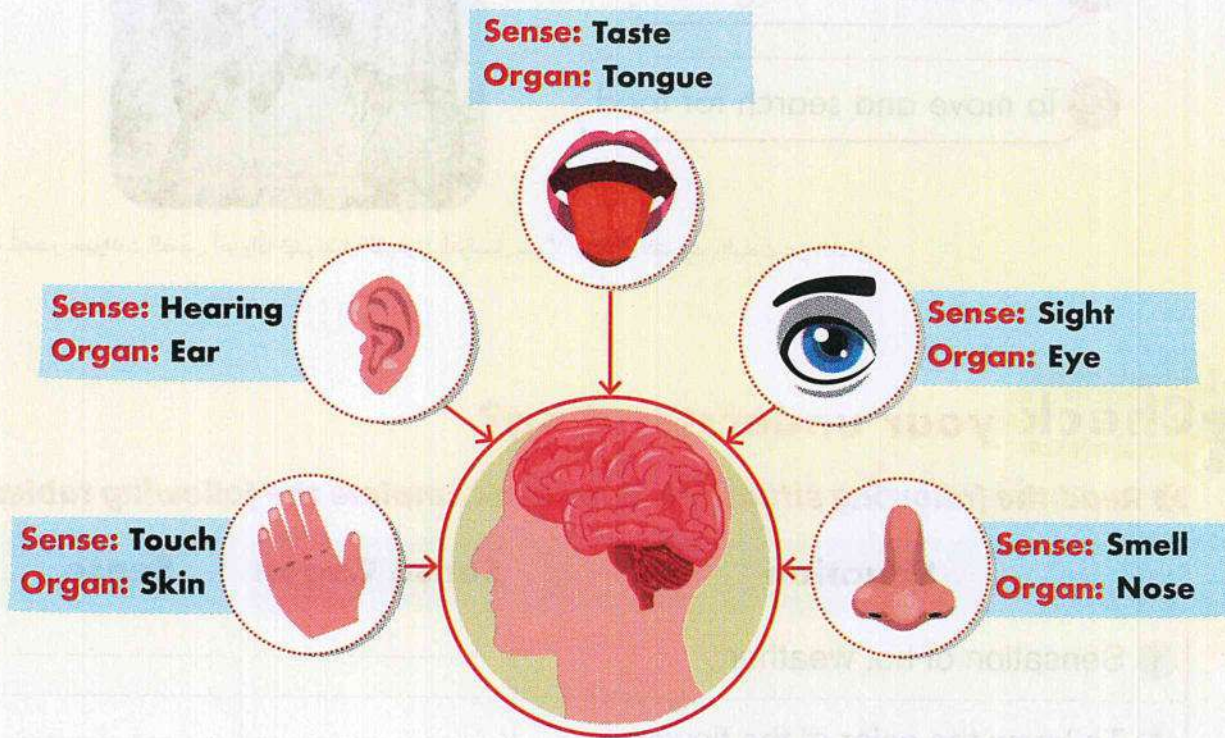
Lesson

1

Activity 1 Can You Explain?

Each sensory organ receives a special type of information from the environment, and then it sends this information to the **brain**.

كل عضو حسي مسئول عن تلقي نوع خاص من المعلومات من البيئة، ثم إرسال تلك المعلومات إلى المخ.



The **brain** translates the information and helps living organisms understand the world around them, communicate, and survive.

يترجم المخ المعلومات، ويساعد الكائنات الحية على فهم العالم من حولها والتواصل والبقاء على قيد الحياة.

Animals and humans use their senses to communicate and transfer information.

Egyptian Mongoose

Egyptian mongooses produce sounds that seem like chatter. **GR**

- 1 To communicate together.
- 2 To move and search for food.



تُصدر حيوانات النمس أصواتًا تبدو مثلثرثرة؛ للتواصل سويًا من أجل التحرك والبحث عن الغذاء.



Check your understanding?

» Read the following situations and then complete the following table:

Situation	Sense Organ	Sense
1 Sensation of hot weather.		
2 To know the color of the flower.		
3 To identify spoiled milk.		
4 To determine the sweet taste of honey.		
5 To listen to music.		

Activity 2 Dolphin Senses

» Some animals have super senses that help them survive in their habitats.

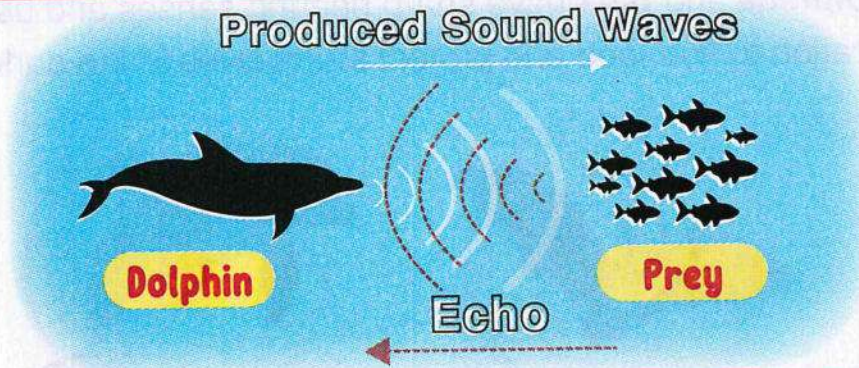
Dolphins' Super Senses



- Dolphins have a sharp **hearing** sense, so they can hear all kinds of sounds.
- Dolphins use the property of **echolocation**, which depends on echo. **GR**
To find food and protect themselves in the dark, murky water.

• لدى الدلافين حاسة سمع قوية، ولذلك يمكنها سماع كل أنواع الأصوات.
• تستخدم الدلافين خاصية تحديد الموقع بالصدى من خلال استخدام صدى الصوت؛ مما يساعدها على البحث عن الطعام وحماية أنفسها تحت الماء في الظلام.

How does a dolphin locate objects in the dark water?



- ① Dolphin produces **sound waves** that travel in water.
- ② When these sound waves hit a solid object, they bounce back to the dolphin in the form of an **echo**.
- ③ Echo helps the dolphin locate the prey and other objects.

- ① يرسل الدلافين موجات صوتية عبر المياه.
- ② عندما ترتطم الموجات بأي جسم صلب، ترتد إلى الدلافين في صورة صدى الصوت.
- ③ يساعد صدى الصوت الدلافين على تحديد موقع الفرائس أو الأجسام في المياه.

The Difference Between Echo and Echolocation:

Echo

- It is the **reflection (bouncing)** of sound waves when they hit a solid object.

• صدى الصوت:

هو انعكاس (ارتداد) الموجات الصوتية عند اصطدامها بجسم صلب.

Echolocation

- It is the **property** that depends on the sense of hearing to detect the sound reflected from solid objects.

• خاصية تحديد الموقع بالصدى:

هي خاصية تعتمد على حاسة السمع لتحديد موقع الصوت المنعكس من الأجسام الصلبة.



NOTE:

- Both **dolphins** and **bats** have sharp hearing senses and use echolocation to find food and protect themselves in the dark.



• تتمتع كل من الدلافين والخفافيش بحاسة سمع حادة، وتستخدم تحديد الموقع بالصدى للعثور على الطعام وحماية أنفسها في الظلام.



Check your understanding?

» Put (✓) or (X):

- 1 Dolphins use their sharp sight sense to get food in the dark water. ()
- 2 The sense of hearing in dolphins is stronger than in human. ()

Activity 3 What Do You Already Know About Senses at Work?

» Animals can use more than one sense for different purposes to adapt and survive in their habitats, as shown in the following examples:

Animal	Super Senses	Purpose
Fox 	• Sight • Hearing	• To avoid danger.
Chameleon 	• Sight • Taste	• To find food.
Dog 	• Smell • Sight	• To recognize friends.
	• Smell • Hearing	• To be used in guarding.
Monkey 	• Sight • Smell • Hearing • Touch • Taste	• To identify objects.



Check your understanding?

» Put (✓) or (X):

- The dog uses the sense of sight to recognize the odor of its friend. ()
- The monkey uses its tongue to taste food. ()

Lesson One

Answered

1 Choose the correct answer:

1.  If you have determined a sweet or bitter taste, you have used your
 (a) tongue (b) eye (c) ear (d) nose [Cairo 2023]
2.  Your sensation of the hot weather depends on the sensory receptors in the
 (a) eyes (b) skin (c) nose (d) ears [Suez 2023]
3.  The organ that is responsible for the sense of touch is the
 (a) ear (b) tongue (c) skin (d) eye
4. You depend on the senses of and when watching TV.
 (a) smell – sight (b) sight – taste
 (c) hearing – touch (d) hearing – sight [Qalyubia 2024]
5. Mongooses communicate together by producing
 (a) flashlights (b) smell (c) sounds (d) heat
6.  Dolphins depend on their sharp sense of to get food. [Damietta 2022]
 (a) sight (b) taste (c) smell (d) hearing
7. Echolocation helps dolphins identify the of their prey. [Cairo 2025]
 (a) color (b) smell (c) location (d) taste
8. Dogs use their sharp senses of and to recognize their friends.
 (a) touch – smell (b) smell – sight
 (c) hearing – touch (d) hearing – taste
9. Both and have sharp senses of sight to avoid danger.
 (a) dolphins – foxes (b) chameleons – foxes
 (c) dolphins – chameleons (d) dogs – dolphins
10. Echoes are the bounced waves used by dolphins to locate objects under water.
 (a) light (b) heat (c) sound (d) water

2 Put (✓) or (X):

1.  The ear is the sense organ responsible for seeing objects. (Cairo 2023) ()
2.  A person can identify spoiled food through his touch sense. (Gharbia 2022) ()
3.  The hearing sense of dolphins is stronger than that of humans. (Giza & Red Sea 2023) ()
4. We can identify the color of a flower using our sense of smell. ()
5. The skin is the sensory organ that makes you feel the smoothness of the cloth. ()
6.  Echoes help dolphins determine the location of the prey. (Dakahlia 2024) ()
7. Echo are the sound waves produced from dolphins to locate their prey. ()
8. The sharp sense of hearing in dolphins is a behavioral adaptation. ()
9. Dolphins use the echolocation property to get oxygen from water. ()
10. Both foxes and panther chameleons have sharp senses of sight to avoid danger. ()

3 Correct the underlined words:

1. When sound waves hit a liquid object, they are reflected back to the source as echo. (.....)
2. We can differentiate between a hot and cold cup of water through our sense of hearing. (.....)
3. Dolphins depend on their sense of smell to locate their prey underwater. (.....)
4. The sense of hearing in dolphins is weaker than that in humans. (.....)
5. You can differentiate between sugar and flour through your sense of sight. (.....)
6.  The organ that is responsible for sight is the ear. (Red Sea 2023) (.....)

4 Write the scientific term:

1. It is the property by which dolphins and bats can locate their prey. (.....)
2.  It is the sense used to differentiate between smooth and rough surfaces. (Azhar 2023) (.....)
3. It is the sense that helps dolphins locate food in the dark, murky water. (.....)
4. It is the reflection of sound waves when they hit a solid object. (.....)

5 Complete the following sentences:

1. Feeling hot or cold depends on sensory receptors in (Banha 2025)
2.  Dolphins use a property called that depends on the sense of to locate their prey underwater. (Qaiyubia 2023) (Alex. 2024)
3.  The is the organ that sends information to the brain when you smell perfume. (Alex. 2024)
4. You can differentiate between water and milk through your senses of and
5.  The organ that is responsible for the sense is the skin. (Red Sea 2023)
6. We can identify the colors by using sense, while we can differentiate between smooth and rough things by sense. (Matrouh 2025)

6 Cross out the odd word:

1.  Taste – Smell – Hearing – Eyes (Cairo – Alex. 2024) (.....)
2. Hearing – Touch – Tongue – Sight (.....)

7 Study the following figures, then complete the sentences below:



Figure (1)



Figure (2)



Figure (3)



Figure (4)



Figure (5)

1. The animal in figure (4) depends on a property called to locate its prey, while the animal in figure (1) depends on a property called to hide from its enemies.
2. The animals in figures (2) and (3) use their to see the prey or their to hear it.
3. The animal in figure (5) is used in guarding because it has sharp senses of and
4. The animal in figure (1) depends on the sense of to taste food, and the sense of to avoid danger.

8 Answer the following questions:

1. Determine the feature that helps the dolphin locate living organisms and things under the surface of water. (Giza 2022)
.....
2. What are the senses used by foxes to avoid danger? (Suez 2023)
.....

9 Give a reason for:

1. Dolphins can hear different types of sounds. (Cairo 2023)
.....
2. Dogs are used in guarding. (Cairo 2023)
.....
3. Egyptian mongooses make sounds. (Banha 2025)
.....

10 What happens if:

1. The sounds produced by a dolphin hit a fish in the water?
.....
2. Dolphins have a weak sense of hearing?
.....

Lesson

2

Activity 4 Senses of Nocturnal Animals

» Some animals adapted to be active at night and use their sharp senses to find food. We call them “**nocturnal animals**”.

• بعض الحيوانات تكيفت لتنشط ليلاً وتستخدم حواسها الحادة للعثور على الطعام في الظلام، ونطلق عليها «الحيوانات الليلية».

Nocturnal animals

They are animals that become more active at night to search for food.

الحيوانات الليلية: هي حيوانات تنشط أكثر أثناء الليل للبحث عن الطعام.



Bat



Owl



Jerboa

Why do some animals hunt at night?

- 1 In very hot places, some animals hunt at night when the weather is cooler.
- 2 Some animals depend on darkness to surprise their prey.
- 3 Some prey are available only at night.

① في الأماكن شديدة الحرارة، تصطاد بعض الحيوانات ليلاً عندما يكون الجو بارداً.

② تعتمد بعض الحيوانات على الظلام لمفاجأة فرائسها.

③ بعض الفرائس متاحة في الليل فقط.

1 Owls

1 Owls' senses:

Owls have extraordinary **sight** and **hearing** senses.

2 Owls' eyes:

Owls have large eyes. **GR**

To allow them to see tiny, far-away movements of their prey.

3 Owls' heads:

Owls can rotate (turn) their heads in all directions. **GR**

To search for prey **everywhere**.

4 Owls' faces:

Owls have bowl-shaped faces and special feathers on the head. **GR**

To direct the distant sounds into the owls' ears.



1 للبومة حاستا بصر وسمع خارقتان.

2 للبومة عيون كبيرة تسمح برؤية الحركات الضئيلة والبعيدة.

3 للبومة قدرة على تحريك رأسها في جميع الاتجاهات؛ للبحث عن الغذاء في كل مكان.

4 للبومة وجه يشبه الوعاء مغطى بالريش؛ لتوجيه الأصوات إلى أذنيها مباشرة.

2 Bats

Bats are **mammals** that can fly.

They have **super hearing** sense and **poor sight** sense.

Bats depend on a property called **echolocation** to find food (preys such as insects) and move around in the dark.



- الخفافيش من الثدييات التي يمكنها الطيران.
- حاسة السمع في الخفافيش خارقة، وحاسة البصر ضعيفة.
- تعتمد الخفافيش على خاصية تسمى «تحديد الموقع بالصدى»: للعثور على الطعام (الفرائس كالحشرات) والتحرك في الظلام.

Comparison between bats and dolphins:

Bats	Dolphins
Difference	
• Bats are nocturnal animals.	• Dolphins are not nocturnal animals.
Similarities	
• Both of them have sharp hearing sense. • Both of them use echolocation to find food.	



Check your understanding?

» Correct the underlined words:

- Dolphins and bats use countershading to find food in the dark. (.....)
- Bats are birds that can fly. (.....)
- Owls and bats have sharp sight senses. (.....)
- Owls and dolphins are nocturnal animals. (.....)

Activity 5 The Nervous System

» Mammals, such as human, elephants, and dogs, have the same structure of the nervous system.

The nervous system consists of:

① Brain

Function:

- It is the main control center in the body.

• الوظيفة: مركز التحكم الرئيسي في جسم الإنسان.

② Spinal Cord

- It is a big nerve that runs through the backbone.

Function:

- It carries messages from the brain to body parts and vice versa.

• هو عصب كبير يمر عبر العمود الفقري.
• الوظيفة: ينقل الرسائل من المخ إلى أجزاء الجسم، وبالعكس.

③ Nerves

- They are distributed throughout the body.
- They connect the sense organs with the brain.

Function:

- They carry messages from the brain to the spinal cord and body parts, and vice versa.

• تتوزع في جميع أنحاء الجسم. • تربط أعضاء الحس و أجزاء الجسم المختلفة بالمخ.
• الوظيفة: تنقل الرسائل من المخ إلى النخاع الشوكي وأجزاء الجسم، وبالعكس.

» The brain is connected to a big nerve that runs through the backbone called the **spinal cord** and branches out into smaller **nerves** distributed all over the body.

• يتصل المخ بعصب كبير يمر عبر العمود الفقري يُسمى النخاع الشوكي، ويتفرع النخاع الشوكي إلى أعصاب أصغر تتوزع في جميع أنحاء الجسم.

How does the nervous system work?

- 1 **Sensory receptors** receive information from the environment.

Sensory receptors

They are special types of nerves that receive information from the environment.

المستقبلات الحسية: هي أعصاب تستقبل المعلومات من البيئة المحيطة.

- 2 **Nerves** carry a message from the sensory receptors to the brain.

- 3 **The brain** translates the message and tells the body what to do.

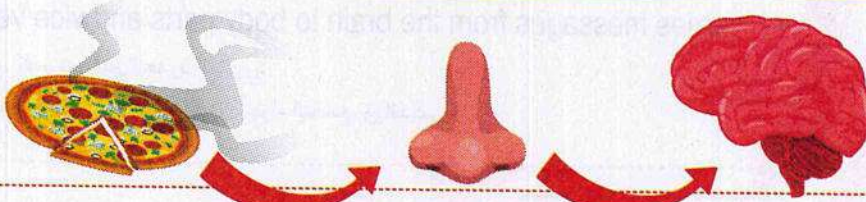


NOTE:

- Some nerves are connected directly to the brain, such as the nerves of the eyes and heart.

• تتصل بعض الأعصاب مباشرة بالمدخ، مثل أعصاب العينين والقلب.

Example: When you smell pizza,



- 1 The sensory receptors at the back of your nose receive the information (pizza odor).
- 2 The sensory receptors send signals along the nerves to the brain.
- 3 The brain translates the information and determines the type of food.

1 تستقبل المستقبلات الحسية الموجودة خلف الأنف تلك المعلومة (رائحة البيتزا).

2 ترسل المستقبلات الحسية إشارة إلى المدخ عبر الأعصاب.

3 يقوم المدخ بمعالجة تلك المعلومة ويحدد نوع الطعام.



Check your understanding?

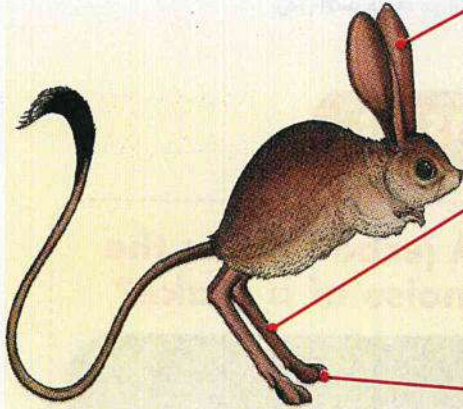
» Put (✓) or (X):

- 1 Both the spinal cord and nerves carry messages in one direction. ()
- 2 The spinal cord is the main control center in the human body. ()

Activity 6 Sensing the Environment

» Egyptian jerboa: It is a **desert rodent** that searches for food at night.

Structural Adaptations:



It has large sensitive ears.

- To hear the quiet movement of snakes.

• له آذان طويلة حساسة تساعد على سماع حركة الثعبان القريب منه.

It has long hind legs.

- To enable it to jump for a long distance.

• له سيقان طويلة؛ لمساعدته على القفز لمسافات طويلة.

It has hair on its feet and toes.

- To help it grip sand when it hops (jumps).

• الشعر الموجود على قدمه وأصابعه يساعده على إمساك الرمال عند القفز.

Behavioral Adaptations:

- Jerboa hops in zigzag patterns to escape quickly from danger.

• يقفز اليربوع في مسارات متعرجة؛ للهروب سريعاً من الخطر.

- Jerboa searches for food at night.

• اليربوع يبحث عن غذائه في الليل.

How do all parts of a jerboa's body work together to avoid danger?

When a snake makes noise as it comes near a jerboa:

1 The sensory receptors in the jerboa's ears send a message through the nerves to the jerboa's brain.

2 The jerboa's brain translates this message and alerts its legs to move.

3 The jerboa's strong legs start to jump away from the snake in zigzag paths.

- » The time taken by a jerboa to react to danger is known as the "reaction time" and this time takes **less than one second**.

Reaction time



It is the time taken by an organism's body to respond to danger.

زمن الاستجابة: هو الوقت الذي يستغرقه الكائن الحي للاستجابة للخطر.

What happens if:

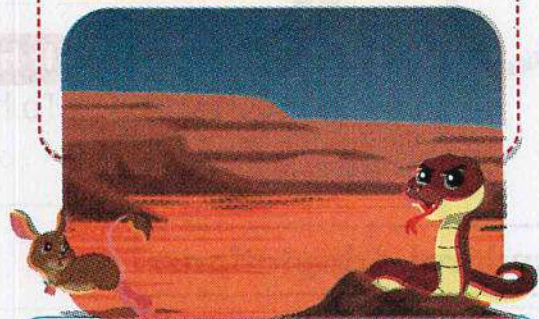
A girl touches the spine of a cactus plant?



She will move (withdraw) her hand away quickly.

عندما تلمس البنت الشوك في نبات الصبار،
تُبْعِد يديها بسرعة.

A jerboa hears the noise of a snake?



It jumps in zigzag paths quickly to escape from danger.

عندما يسمع اليربوع صوت الثعبان،
يقفز سريعاً ويهرب.



Check your understanding?

» Arrange the following steps:

- (.....) The jerboa jumps in zigzag paths quickly.
- (.....) The brain translates the message.
- (.....) On hearing danger, the sensory receptors sense it.
- (.....) The brain sends a response to alert the jerboa's legs.
- (.....) The sensory receptors in the ears send messages to the brain.

Lesson Two

Answered

1 Choose the correct answer:

1. Animals that become active at night are called animals. (Cairo 2023)
 (a) diurnal (b) nocturnal (c) extinct (d) endangered
2. use echolocation by producing high-pitched sounds in the air.
 (a) Dolphins (b) Owls (c) Whales (d) Bats (Alex. 2023)
3. has the ability to turn their heads in all directions.
 (a) Snake (b) Jerboa (c) Dolphin (d) Owl (Cairo 2025 - 2024)
4. Owls are birds that have strong senses.
 (a) sight and taste (b) hearing and sight
 (c) touch and smell (d) sight and touch (Menofia 2024)
5. All the following are components of the nervous system, except the
 (a) brain (b) spinal cord (c) nerves (d) heart
 (Dakahlia 2025 - Red Sea 2024)
6. The nervous system of consists of the brain, spinal cord and nerves, such as elephants and dogs.
 (a) rodents (b) birds (c) mammals (d) reptiles (Giza 2023)
7.  The sense organs collect information and send signals to the for processing and understanding.
 (a) nerves (b) lungs (c) brain (d) spinal cord (Port Said 2022)
8. What carries the message from your eyes to your brain when you see something?
 (a) Nerves. (b) Muscles. (c) Veins. (d) Glands. (Gharbia 2022)
9. When your hand touches the spines of a cactus plant, it is withdrawn in second(s).
 (a) one (b) two (c) less than one (d) ten (Suez 2023)
10.  The time taken by the body to react to different information (danger) is called the time.
 (a) absorption (b) digestion (c) reaction (d) respiration

11.  is the main control center in the body of living organisms.
 (a) Heart (b) Lung (c) Brain (d) stomach
12. The spinal cord is connected to the brain and located inside the
 (a) lungs (b) skull (c) heart (d) backbone (Cairo 2025)
13. When you touch an ice cube with your index finger, your tells you it is cold.
 (a) index finger (b) hand (c) brain (d) skin
14. Which of the following is considered a behavioural adaptation?
 (a) Bowl-shaped faces of owls.
 (b) Hopping of jerboas in a zigzag path.
 (c) Sharp hearing sense of dolphins.
 (d) Long hind legs of rabbits.

2 Put (✓) or (X):

1. Nocturnal animals become active in morning to look for their food. (Cairo 2025) ()
2. An owl has large eyes, while a jerboa has large ears. ()
3. Owls have both extraordinary sight and hearing senses. (Suez 2023) ()
4. The bat rely on its hearing sense to search for food. (Alex. 2024) ()
5.  The spinal cord is the main control center in the human body.
 ([Matrouh 2025 – Alex. 2024] ()
6. The brain is responsible for processing information. (Cairo 2022) ()
7. The nerves transfer massages from the brain to all body parts and vice versa.
 (Menofia 2024) ()
8. Both the spinal cord and nerves carry messages in one direction. ()
9. Each part of the nervous system works separately. ()
10. There is integration between the senses and the nervous system to interact with the surrounding environment. ()

11. The Egyptian jerboa can jump for a long distance with its long hind legs.

(Kafr El-Sheikh 2022) ()

12. As the jerboa's reaction time increases, it escapes faster from danger. ()

13. On hearing danger, the sensory receptors in the jerboa's ears send a message to the brain. ()

14. Jerboas have large ears and long hind legs. (Qalyubia 2024) ()

15. Egyptian jerboa depends on echolocation to find food. (Port Said 2025) ()

3 Correct the underlined words:

1. Being active at night in some animals is a structural adaptation. (.....)

2. An owl can rotate its eyes in all directions. (.....)

3. The eyes send messages to the spinal cord through the nerves. (.....)

4. The sensory receptors in the tongue receive the scent of a pizza. (.....)

5. The spinal cord extends inside the skull. (.....)

6. The skin is an important organ of the digestive system. (Dakahlia 2023) (.....)

7. A jerboa's long hind legs are considered behavioral adaptations. (Damietta 2022) (.....)

4 Write the scientific term:

1.  They are animals that are active at night. (.....)

2. It is a bird with a bowl-shaped face and large eyes. (Giza 2022) (.....)

3. It is a flying mammal that depends on echolocation to locate insects. (.....)

4. It is the system that controls all the body's functions, and nerves are one part of it. (Cairo 2022) (.....)

5. It is a property by which a bat can locate insects through the sound reflected from them. (Port Said 2023) (.....)

6.  It is the main control center of the human's body. (Assiut – Fayoum 2023) (.....)

7. It is a big nerve that is located inside the backbone. (.....)

8. They are special types of nerves found in the sensory organs that receive information from the environment. (.....)

9.  It is the time taken by an organism's body to respond to danger. (Kafr El-Sheikh 2023) (.....)

10. It is a desert rodent that has very large ears and long hind legs. (.....)

11. They are nerves connected directly to the brain. (.....)

5 Complete the following sentences:

1.  The nervous system includes, and (Cairo 2025)

2. Owls can detect the place of their prey by using their sharp senses of and (Cairo 2023)

3. The eyes send messages to the brain through the (Dakahlia 2023)

4. The is the main control organ in the body. (Azhar 2023)

5. Few nerves are connected directly to the brain, such as the nerves of the

6.  is the time that body takes to receive information from the environment. (Cairo 2025)

7.  and are examples of nocturnal animals.

8.  The is like the command for the human body.

9.  When the Egyptian jerboa feels danger, the brain sends messages to its legs through the

6 Cross out the odd word:

1. Bats – Owls – Dolphins – Jerboas (.....)

2. Nerves – Lungs – Brain – Spinal cord (Giza 2025) (.....)

7 Study the following figure, then answer the questions below:

1. What does the opposite figure represent?

.....

2. Does this system exist in the human body only?

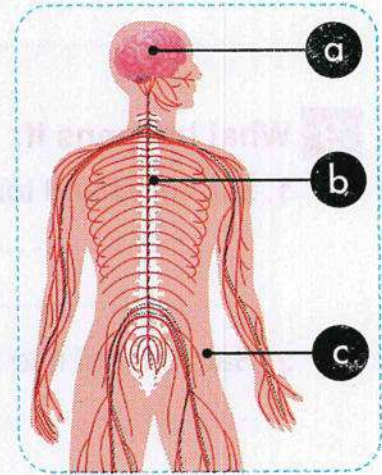
.....

3. Label the figure:

(a)

(b)

(c)



8 Give a reason for:

1. Bats and owls are nocturnal animals.

.....

.....

2. The Egyptian jerboa has long hind legs.

(Menofia 2024 – Ismailia 2023)

.....

.....

3.  Egyptian jerboa can jump for long distance.

(Cairo 2025)

.....

.....

4.  Owl turns its head in all direction.

(Banha 2025)

.....

.....

5.  Animals that live in hot places become active at night.

.....

.....

6. Owls can hunt at night.

(Alex. 2025)

.....

.....

7.  Bats can locate their prey in the dark.

(Sharkia 2023)

9 What happens if:

1.  Your hand touches the thorns of a cactus plant?

2. Bats cannot use the echolocation property?

(Dakahlia 2023)

3.  Jerboas' legs are short?

(Menofia – Port Said 2023)

10 Mention one function of:

1. The brain in the human body.

2. The spinal cord in the human body.

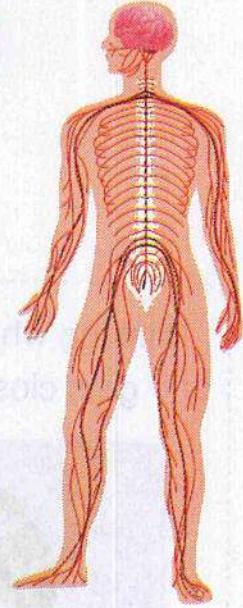
3. The nerves in the human body.

Lesson

3

Activity 7 How the Nervous System Works

Functions of the nervous system:



- 1 It gathers information through the sensory organs.
- 2 It interprets and processes the information.
- 3 It tells the body what to do.

- 1 يقوم بجمع المعلومات من خلال أعضاء الحواس.
- 2 يقوم بترجمة ومعالجة تلك المعلومات.
- 3 يقوم بإرسال استجابة مناسبة لما ينبغي أن يقوم به الجسم.

For example, the girl hears a chirping bird:

- 1 The sensory receptors in the ears pick up the sound waves produced by the chirping bird.



- 2 The nerves carry the information to the brain.



- 3 The brain interprets this information.



- 4 The brain sends a message to the body about what to do so the girl turns to look for the bird on the tree.



- 1 الحواس المستقبلية في الأذن تستقبل المعلومات (صوت الطائر المغرد).
- 2 ترسل الأعصاب تلك المعلومات إلى المخ.
- 3 يترجم المخ تلك المعلومات ويقوم بتفسيرها.
- 4 يرسل المخ رسالة إلى الجسم ليخبره ماذا ينبغي أن يقوم به؛ لذلك تلتفت الفتاة للبحث عن الطائر على الشجرة.

Reflexes

They are fast messages sent by the nervous system, and we are barely aware of.

رد الفعل المنعكس: هو رسائل سريعة تصدر من الجهاز العصبي بسرعة كبيرة لا نتمكن من إدراكها.

Examples of Reflexes:

1

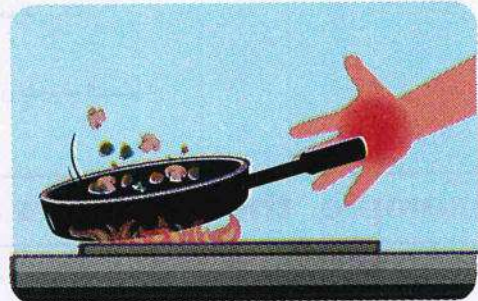
Blinking when a strange object gets closer to your eyes.



إغماض العينين عندما يقترب منها جسم.

2

Moving your hand away when you touch a hot object.



تحريك يدك بعيداً عند لمس جسم ساخن.

NOTE:

• Some messages are sent to and from the brain automatically, like the signal to **breathe**.

• بعض الرسائل تُنقل إلى المخ تلقائياً، ولا يمكننا التحكم بها، مثل التنفس.



Check your understanding?

» Put (✓) or (X):

- 1 Nerves are responsible for processing information. ()
- 2 The spinal cord is the main control center in the human body. ()

Activity 8 Describing the Nervous System

The parts of the nervous system work together to:

1

Sense the environment.

2

Interpret the information to decide the best action.

3

Send a signal to the body to react.

تعمل أجزاء الجهاز العصبي معًا لإدراك البيئة وتفسير المعلومات للقيام بالفعل المناسب؛ ومن ثمَّ نقل الإشارات إلى الجسم للاستجابة.

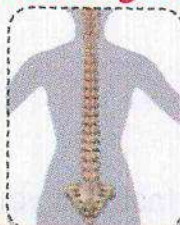
Without all of the parts of the nervous system, the person might not receive, send, or react to any information.

لن يتمكن الشخص من استقبال المعلومات وإرسالها والاستجابة لها بدون وجود كل أجزاء الجهاز العصبي.



Check your understanding?

» Look at the following images: Which of these is part of the nervous system? Circle all that applies.



Spinal cord



Brain



Nerves



Blood

» Read the following sentences that describe the nervous system, then choose the suitable word from the brackets:
(nervous system - nerves - reflexes - brain)

- 1 The is like the command center for your body.
- 2 The send(s) messages to the brain.
- 3 The brain is a part of the
- 4 are messages sent by the nervous system that are often so fast that you don't think about them.

Lesson Three

Answered

1 Choose the correct answer:

1.  The system responsible for moving your hand away from danger is the system. (Cairo 2024)
 (a) digestive (b) respiratory (c) nervous (d) stomach
2.  The system collects information about what is happening inside and outside the body.
 (a) respiratory (b) digestive (c) urinary (d) nervous
3. If you smell smoke from something burning nearby, then you realize that you have to move fast, which means that there is an integration between the system and system. (Alex. 2022)
 (a) digestive – respiratory (b) nervous – digestive
 (c) respiratory – nervous (d) urinary – nervous
4. The brain is responsible for all the following, except
 (a) interpreting the information
 (b) sending signals for the muscles to move
 (c) receiving signals from the sensory receptors
 (d) gathering the information
5.  Some messages are sent by the nervous system so fast that you are barely aware of them; these are known as
 (a) heart (b) brain (c) reflexes (d) stomach
6. What is the correct sequence that explains the following figure?
 (a) Eyes → Nerves → Hands → Brain
 (b) Hands → Brain → Nerves → Eyes
 (c) Eyes → Nerves → Brain → Hands
 (d) Hands → Brain → Eyes → Nerves
7.  The organ responsible for pain when your hands touch spines is
 (a) nerves (b) lung (c) eyes (d) brain (Cairo 2025)



2 Put (✓) or (X):

1. The brain processes the sound waves coming from a radio. ()
2. All the components of the nervous system work together. ()
3. The sensory receptors in your tongue identify the sour taste of a lemon. ()
4. Nerves are branches that are found throughout the body of a living organism. ()
5. Your hand sends signals to the spinal cord to identify hot or cold objects. ()
6. Echo is collected by bat's eyes for it to be processed by the brain. ()
7. Some messages are transmitted automatically from the brain like the signal to breathe. ()
8. Blinking your eyes when something comes near them is considered a reflex action. ()
9.  The reflexes are fast messages, you are barely aware of them. ()

(Alex. 2023) ()

3 Correct the underlined words:

1. Your ear is responsible for processing the sound waves coming from the cars' horns. (.....)
2. Your dog can recognize you by your smell, depending on its sense of sight. (.....)
3. When you see lightning, your ears send signals to the brain via the nerves. (.....)
4. The digestive system helps you recognize the taste of pizza. (.....)

4 Complete the following using the words between the brackets:

(skin – reflex – nervous system – breathe – withdraw)

1. When touching a very hot object, you quickly your hand as a action.
2. The sensory receptors in the sense the coldness of the weather.
3. The system which is responsible for reflexes is the
4. The brain sends automatic signals to

(Assiut 2023)

5 Write the scientific term:

1. They connect the components of the nervous system together. (.....)
2. It is an organ that translates information and sends the suitable response to the muscles. (.....)
3. They are messages that are transmitted so fast by the nervous system that you are barely aware of. (.....)
4.  It is the body system that controls all body functions and nerves are part of it. (.....)

6 Choose from column (A) what suits it in column (B):

(Cairo 2022)

Column (A)	Column (B)
1. It processes information like a computer.	a) a reflex action takes places.
2. When something comes near your eyes,	b) using your sight sense.
3. When an object falls from your hand, you catch it	c) The brain

1 2 3

7 Study the following figures, then complete:

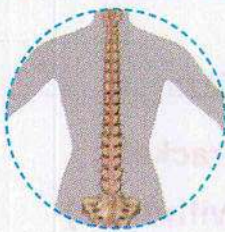


Figure (1)

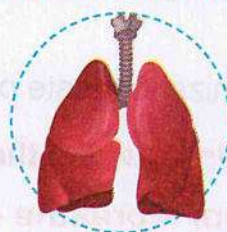


Figure (2)

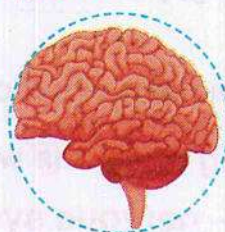


Figure (3)

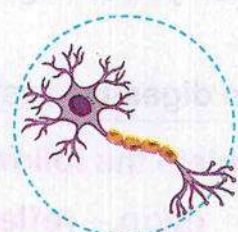


Figure (4)

1. Figure (.....) is not from the components of the nervous system.
2. Figure (.....) is the main control center of the living organism's body.
3. Figure (.....) is located inside the backbone, and is connected to the brain by the component in figure (.....).

8 Give a reason for:

- The nervous system has great functions.

.....

.....

9 What happens if:

- Your foot touches a nail on the ground?

(Cairo 2023)

.....

.....

10 Mention one function of:

- The nervous system.

.....

.....

Lesson

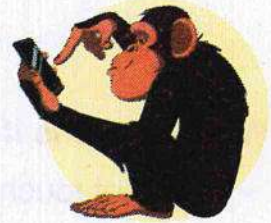
4

Activity 9 How Animals Use Communication Systems

Do animals use technology systems to communicate?

☐ Yes

☐ No



Human Communication

- » People first started sharing information using **written symbols**.
- » Technology systems allow humans to communicate over great distances by:

Calling



Sending texts



Sending emails



- بدأ البشر مشاركة المعلومات بالرموز المكتوبة.
- تتيح لنا أنظمة التواصل التكنولوجية: إجراء المكالمات الهاتفية، وإرسال الرسائل النصية ورسائل البريد الإلكتروني، عبر مسافات بعيدة.

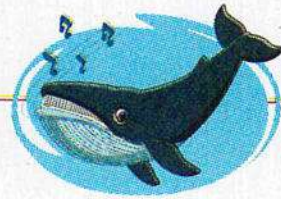
Animals Communication

- » Animals don't speak, so they can't use the same technology system as humans.
- » Animals use their own **communication systems** to communicate, for example:

Ants communicate together using their **sense of smell**.



Humpback whales communicate by **singing a wide range of tones**.



- لا تتكلم الحيوانات مثل الإنسان؛ وبالتالي لا تستطيع الحيوانات استخدام أنظمة التواصل التكنولوجية.
- تستخدم الحيوانات أنظمة تواصل خاصة بها، فعلى سبيل المثال:
_ تستخدم النمل حاسة الشم للتواصل فيما بينها. _ تغني الحيتان الحذاء نغمات مختلفة للتواصل فيما بينها.

1 Ants Communication

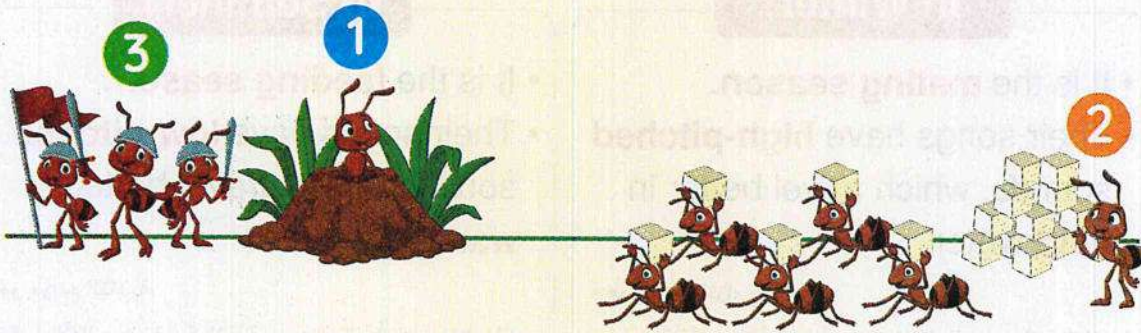
- Ants live in **colonies** of thousands of individuals.
- Ants use their sense of **smell** to communicate.

• يعيش النمل في مستعمرات بها آلاف الأفراد. • يستخدم النمل حاسة الشم للتواصل.



» Ants have developed systems that help them divide their work.

» Groups of ants within a colony have **different roles**.



1 Nurse Ants

Nurse ants send smelly messages to scout ants when there is a shortage (lack) of food.

2 Scout Ants

- Scout ants search for food and locate it.
- Scout ants send a smelly message to alert the other ants where to find food.

3 Soldier Ants

Soldier ants use smelly messages to communicate if there is danger nearby.

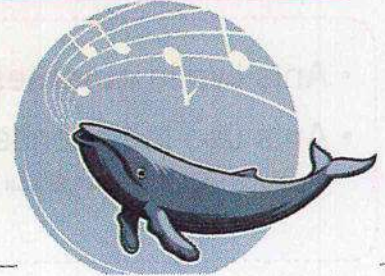
• يتبع أفراد النمل داخل المستعمرة الواحدة أنظمة تساعد على تقسيم العمل فيما بينها.

• تؤدي مجموعات النمل أدوارًا مختلفة داخل المستعمرة:

- 1 **عاملات النمل:** تُطلق رائحة قوية كرسائل تنبيه عند نقص الطعام.
- 2 **النمل الكشاف:** يبحث عن الطعام، ثم يرشد عنه؛ حيث يرسل رائحة لتنبيه النمل الآخر بموقع الطعام.
- 3 **جنود النمل:** تتواصل معًا بإطلاق الروائح في حالة وجود خطر قريب.

2 Humpback Whales Communication

- » They sing a wide range of **tones** and a series of **songs** to communicate with each other.
- » The songs of humpback whales have **different sound pitches** depending on the **season**.



• تغني الحيتان الحدباء بنغمات مختلفة وسلسلة من الأغاني؛ للتواصل مع بعضها تحت المياه.
• تختلف حدة الصوت في الأغاني التي تصدرها الحيتان الحدباء حسب الفصول المناخية.

In Winter:

- It is the **mating season**.
- Their songs have **high-pitched** sounds, which travel better in **cold** water.

• هو موسم التزاوج.
• تكون الأغاني عالية النغمة، حيث تنتقل أفضل خلال البرودة.

In Summer:

- It is the **feeding season**.
- Their songs have **low-pitched** sounds, which travel better in **warm** water.

• هو موسم التغذية.
• تكون الأغاني منخفضة النغمة، حيث تنتقل أفضل خلال الماء الدافئ.



- A man has a **rough** voice. (**Low**-pitched sounds)
- A woman has a **sharp** voice. (**High**-pitched sounds)



Check your understanding?

» Put (✓) or (X):

- 1 Groups of ants in a colony have similar roles. ()
- 2 Humpback whales sing low-pitched sounds during the mating season. ()

STEM in Action

Activity 10 Technology Inspired by Nature

Bats use sounds to:

- 1 Communicate with each other.
- 2 Get information about their surroundings.

How do bats locate objects in the dark?

- 1 A bat makes a high-pitched sound.
- 2 When the sound hits an insect, it reflects back in the form of an echo.
- 3 The bat listens for the echo and locates the insect nearby.



1 يُصدر الخفاش صوتًا ذا نغمة عالية. 2 عندما يصطدم الصوت بحشرة، فإنه يترد مرة أخرى. 3 يسمع الخفاش الصدى ويحدد موقع الحشرة القريبة منه.

Bat-Inspired Technology (Special Cane)

- » Scientists created a **special cane** to help **blind people** detect their surroundings.
- ابتكر العلماء عكازًا يُصدر صوتًا عالي التردد؛ لمساعدة الشخص الكفيف لتحديد موقع الأشياء المحيطة به.

How does a blind person use the cane?

- 1 The special cane emits a high-pitched sound.
- 2 When the sound hits an object, it reflects as an echo.
- 3 The special cane changes the **echo** into **vibrations**. 

To allow the blind person to detect the echo using his **thumb (touch sense)** so he can know the directions of objects (obstacles) around him/her.



- 1 يُصدر العكاز صوتًا عالي التردد.
- 2 عندما يصطدم الصوت بجسم ما، فإنه يترد على شكل صدى صوت.
- 3 يحول العكاز صدى الصوت إلى اهتزازات يشعر بها الكفيف بإبهامه (حاسة اللمس) فتدله على الأجسام من حوله.

Give a reason for:

① Bats use their ears to “see” in the dark.

- Because bats use their ears for echolocation, which enables them to get information about their surroundings.

② A special cane helps a blind person walk alone.

- Because the cane picks up the echo and turns it into vibrations that tell the blind person about nearby bodies.

Similarities and Differences Between Bats and Canes



	Bats	Special canes of a blind person
Similarities	• They depend on the echo to locate things. • They produce high-pitched sounds.	
Differences	• Bats can't change the echo into vibrations. • Bats use their strong hearing sense to pick up the echo.	• Canes change the echo into vibrations. • A blind person uses his sense of touch to feel the vibrations.



Check your understanding?

» Put (✓) or (X):

- 1 Unlike bats, humans can hear the echo. ()
- 2 Bats can detect an echo using their sense of touch. ()

Lesson Four

Answered

1 Choose the correct answer:

1.  Ants communicate with each other using (Cairo 2025)
 (a) sight (b) taste (c) touch (d) smell
2. Nurse ants send a smelly message to scout ants when
 (a) there is mating season (b) there is nearby danger
 (c) there is a lack of food (d) there is plenty of food
3. are responsible for searching for the food resources.
 (a) Nurse ants (b) Scout ants (c) Solider ants (d) Queen ants
4. produce high-pitched sounds in winter. (Alex. 2023)
 (a) Owls (b) Humpback whales
 (c) Ants (d) Salamanders
5.  Humpback whales communicate with each other through
 (a) singing (b) flashing (c) dancing (d) light
6. Humpback whales use singing to (Dakahlia 2023)
 (a) warm themselves up (b) hide from enemies
 (c) communicate (d) cool their bodies
7. The mating season in which the humpback whales sing is the season.
 (a) winter (b) summer (c) spring (d) autumn (Dakahlia 2023)
8. All the following have a super sense of hearing, except
 (a) humpback whales (b) bats
 (c) human (d) dolphins
9. is a property used by dolphins and bats to locate their prey.
 (a) Countershading (b) Camouflage
 (c) Echolocation (d) Panting
10.  A blind person's cane emits to tell him the directions.
 (a) smells (b) lights (c) tones (d) vibrations

11. Bats use their strong sense of to detect echo.

- (a) sight (b) smell (c) hearing (d) touch

12. Both bats and special canes

- (a) can change echoes to vibrations
(b) can't change echoes to vibrations
(c) produce high-pitched sounds
(d) detect echoes using the hearing sense

2 Put (✓) or (X):

1. Groups of ants have the same role in the same colony. ()

2. Scout ants are responsible for alarming the colony in danger. (Qalyubia 2023) ()

3. Humpback whales sing during the winter months for mating. (Azhar 2024) ()

4. Humpback whales can sing underwater. (Qalyubia 2023) ()

5. Humpback whales change their sound pitches throughout the seasons. (Giza 2023) ()

6. In winter, the songs of humpback whales have high-pitched sounds. (Menofia 2023) ()

7. Humpback whales produce low-pitched sounds in the mating season. (Kafir El-Sheikh 2023) ()

8. Echolocation is a type of communication between owls. (Qalyubia 2023) ()

9.  Bats use their sense of smell to avoid danger. (Cairo 2023) ()

10.  Ants can communicate with each other by singing. ()

11.  The scientific idea of a blind person's cane is echolocation. ()

3 Correct the underlined words:

1. Ants depend on their sense of sight to communicate. (.....)

2. Nurse ants send a smelly message when there is plenty of food. (.....)

3. The special cane can help a deaf person locate things. (.....)

4. Women's voices are lower in pitch than those of men. (.....)
5. In a blind person's cane, the echo is turned into flashlights. (.....)
6. Without their strong sense of smell, bats can't find food. (.....)

4 Complete the following sentences:

1. The winter months are considered the season for humpback whales. (Cairo 2022)
2. A group of ants sends to communicate with each other. (Cairo 2023)
3. sing underwater for communication. (Suez 2024)
4. Humpback whales produce low-pitched sounds during the months. (Dakahlia 2023)
5. Humpback whales communicate with each other by their sense of, where they sing a wide range of and a series of (Minia - Assiut 2023)
6. If the amount of food in the ant's colony decreases, the ants send messages to ants to alert them to find the food. (Giza 2025)

5 Write the scientific term:

1. It is the sense that helps ants communicate together. (.....)
2. It is the sense used by bats to detect an echo. (.....)
3. They are ants that send a smelly message when there is a shortage of food. (Alex. 2023) (.....)
4. They are ants that send a smelly message to alert the other ants where to find food. (Alex. 2023) (.....)
5. They are ants that send smelly messages when there is danger nearby. (.....)

6. They are living organisms that sing a wide range of tones underwater to communicate together. (.....)
7. It is a property used by dolphins and bats to locate their prey. (.....)
8. It is a special device used by a blind person to locate things nearby. (.....)
9. They are organisms that communicate with each other through the sense of smell. (.....)

6 Cross out the odd word:

1. Acacia trees – Kapok trees – Bats – Ants (.....)
2. Humpback whales – Mongooses – Ants – Dolphins (.....)
3. Bats – Blind people's canes – Humpback whales – Owls (.....)

7 Classify the following according to the sense that the living organism uses to communicate or locate things:

Humpback whales – Ants – Bats – A blind person's cane

Hearing Sense	Smell Sense	Touch Sense
.....		

8 How do humpback whales communicate with each other?

(Cairo 2023)

.....

9 Give a reason for:

1. Nurse ants send a smelly message to alert scout ants.
.....
2. Sometimes soldier ants send smelly messages to the other ants.
.....
3. Bats use their ears to "see" in the dark.
.....

4. A special cane helps a blind person walk alone.

5. There are some similarities between bats and the special canes used by blind people.

10 What happens if:

1. The amount of food in a colony is low?

2. A danger threatens the colony?

3. Bats have a weak sense of hearing?

4. Humpback whales cannot sing underwater?

5. The cane of a blind person picks up an echo?

11 Mention one function of:

- The cane used by a blind person.

12 Mention the similarities between a bat and a blind person cane.

13 Explain how a bat uses echolocation.

14 Study the following figures, then complete the sentences below:



Figure (1)



Figure (2)

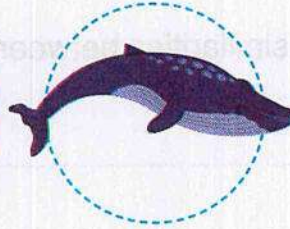


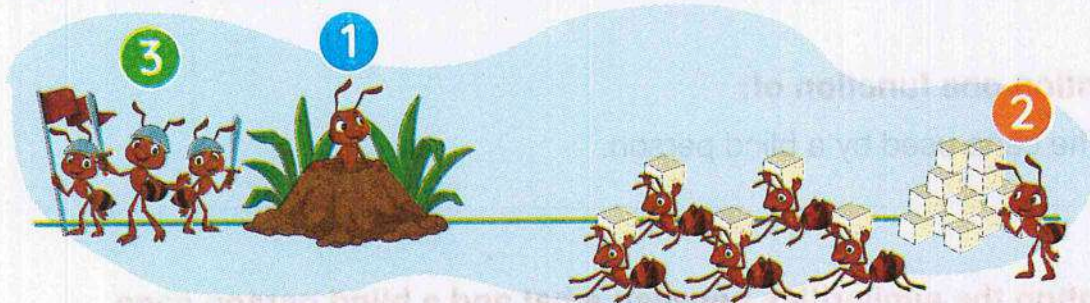
Figure (3)



Figure (4)

1. The tool in figure (1) is inspired by the in bats.
2. The man in figure (1) uses his to feel the vibrations produced from the cane.
3. The animal in figure (2) uses its to detect the echo reflected from a mosquito.
4. The animal in figure (3) produces sounds in the feeding season.
5. The ant in figure (4) communicates with other ants by their sense of

15 Study the following figure, then put (✓) or (x):

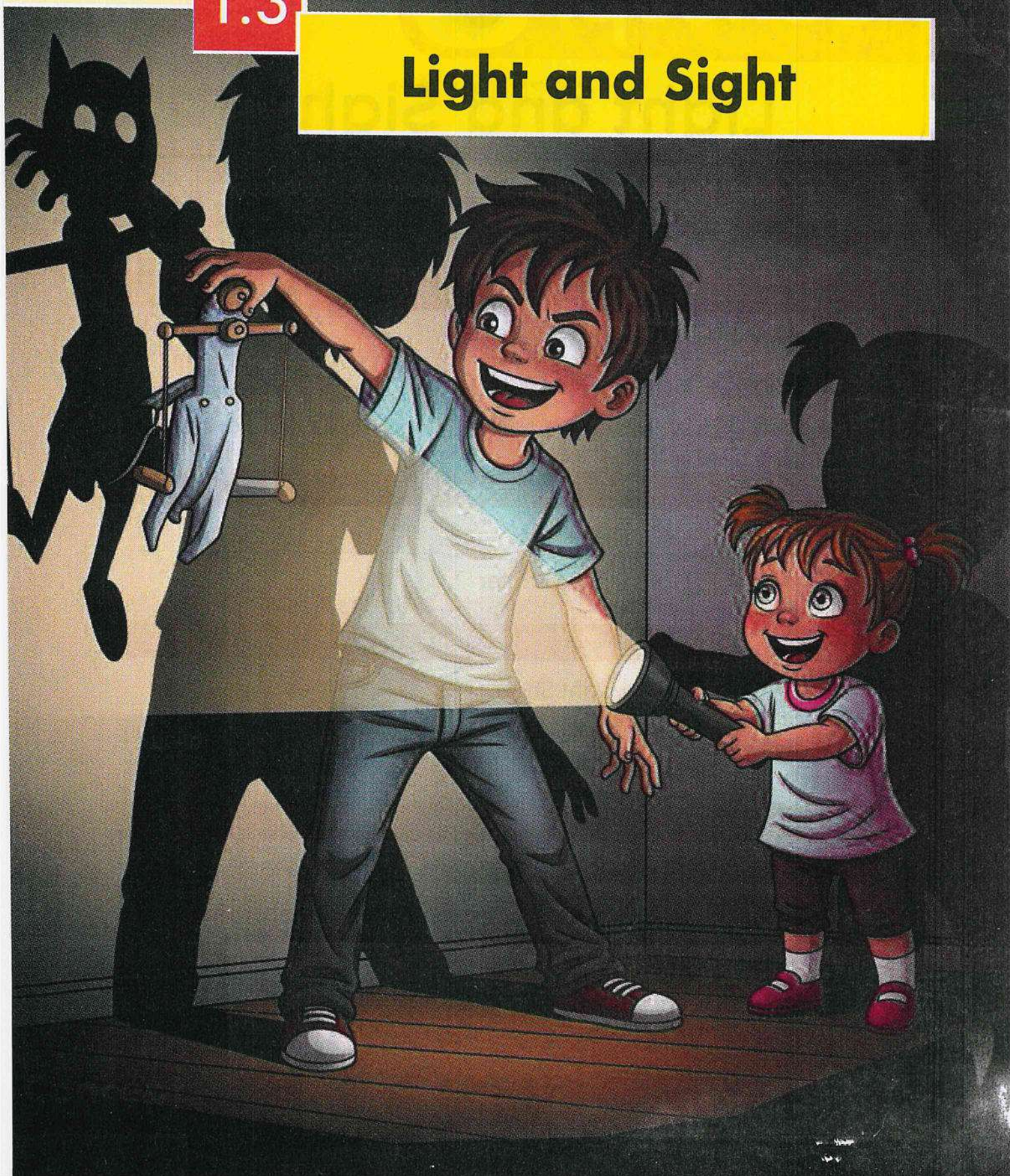


1. Ant ② has different role than ants ③. ()
2. Ants ③ work together to protect the colony from any danger. ()
3. Ant ② alerts ant ① if the food is low. ()
4. Ants have developed systems that help them divide their work. ()

Concept

1.3

Light and Sight



Concept 3

Light and Sight

Lesson 1

- | | |
|------------|---|
| Activity 1 | Can You Explain? |
| Activity 2 | Hunting with Night Vision |
| Activity 3 | What Do You Already Know About Light and Sight? |

Lesson 2

- | | |
|------------|----------------------|
| Activity 4 | Light Reflection |
| Activity 5 | Light Strikes Matter |

Lesson 3

- | | |
|------------|--|
| Activity 6 | Firefly Light Show |
| Activity 7 | What Do You Already Know About Communication and Information Transfer? |

Lesson 4

- | | |
|------------|--|
| Activity 8 | Transferring Information |
| Activity 9 | Review: Communication and Information Transfer |

Glossary

Lesson (1)

Activity (1)

Light	الضوء المتاح	vision	الرؤية	Bright	مضيء	Dim light place	منخفض الإضاءة
-------	--------------	--------	--------	--------	------	-----------------	---------------

Activity (2)

Clearly	بوضوح	Source of light	مصدر ضوء	Night vision goggle	نظارات الرؤية الليلية	Fishing cat	القط السمك
Poor	ضعيف	Excellent	ممتاز	Wild cat	قط بري	Night Vision	رؤية ليلية
Glow	تلمع	Complete darkness	ظلام دامس	Mirror-like membrane	غشاء يشبه المرآة	Pupil	حدقة العين
Wider	أكثر اتساعاً	Narrower	أضيق				

Activity (3)

Emit (give off)	يبعث	Electric Lamp	مصباح كهربائي	Candle	شمعة	Flashlight (Torch)	كشاف ضوئي
Reflect	يعكس	Straight lines	خطوط مستقيمة				

Lesson (2)

Activity (4)

Mirror	المرايا	Cloth	قماش	Wood	خشب	Metals	معادن
Papers	ورق	Plastic	بلاستيك	Shiny	لامع	Smooth	ناعم
Rough	خشن	Materials	مواد	Reflection	انعكاس	Object	جسم

Activity (5)

Pass = transmit	يمر	Absorbed	المتص	Transparent	شفاف	Opaque	معتم
Waves	موجات	Lens	عدسات	Human body	جسم الإنسان	Shadow	الظل
Scatter (diffuse)	يشتت	Direction	اتجاه				

Lesson (3)

Activity (6)

Fireflies	الخنافس المضيئة	Mangroves trees	أشجار المانجروف	Winged beetles	خنافس مجنحة	Flies	ذباب
Chemical reaction	تفاعل كيميائي	Light up	تضيء	Flash patterns	ومضات مضيئة	Warn off	تحذر من
Attract a mate	جذب رفيق	Reproduce	تتكاثر	Regular	منتظمة	Periods	فترات
Traffic lights	إشارات المرور	Lighthouses	منارات السفن				

Activity (7)

Reading	القراءة	Writing	الكتابة	Language	لغة	Displaying light	تطلق ومضات ضوئية
Cell phone	هاتف جوال	electronic reader	قارئ إلكتروني				

Lesson (4)

Activity (8)

Wave	يلوح	Rescue flare	شعلة إنقاذ	Attract attention	جذب انتباه	Hikers	الرحالة
Helicopter	طائرة هليكوبتر	Signal fires	شعلة مضيئة	Code	شفرة	Thumbs	الإبهام
Predict	يتوقع	Facial expressions	تعبيرات الوجه	Arrangement	ترتيب	Arranged	مُرتبة
Symbols	رموز	Letters	حروف	Sailors	البحارة	Drums	طبول
Interpret (Decoded)	يفسر						

Lesson

1

Activity 1 Can You Explain?

» **Eye** is the sense organ that is affected by **light** in humans and animals.

» The amount of light in an area affects the vision of humans:

In a bright place

- Humans can see objects clearly.



In a dim light place

- Humans see objects less clearly and still needs more light.



In the dark

- Humans can't see anything, so humans depend on other senses, such as touch.



• تؤثر كمية الضوء المتوفرة في منطقة ما على رؤية الإنسان:

- في المكان المضيء، يستطيع الإنسان رؤية الأجسام بوضوح.
- في المكان ذي الإضاءة الخافتة، يرى الإنسان الأجسام بشكل أقل وضوحًا، ويظل بحاجة إلى المزيد من الضوء.
- في الظلام، لا يستطيع الإنسان رؤية أي شيء؛ لذا يعتمد الإنسان على الحواس الأخرى، مثل اللمس.

Humans need a **source of light** to see objects clearly.



يحتاج الإنسان إلى مصدر ضوء، حتى يرى الأشياء بوضوح.

Some animals, such as **fishing cat** can see better than the humans in low light places.



بعض الحيوانات، مثل القطة السمك، يمكنها الرؤية بشكل أفضل من الإنسان، في الأماكن منخفضة الإضاءة.

Activity 2 Hunting with Night Vision

Fishing Cat:

It is a wild cat that hunts for food at night, depending on having excellent night vision.

القط السمك: هو قط بري يبحث عن الطعام ليلاً معتمداً على قدرته على الرؤية الليلية.



Give a reason for:

• The fishing cat's eyes seem to glow in the dark.

- Because it has a **mirror-like membrane** at the back of its eyes.
- This membrane reflects any light entering its eyes, allowing it to collect more available light.

• تتوهج أعين القط السمك في الظلام؛ لأنها تحتوي على غشاء يشبه المرآة في الجزء الخلفي من عينيه.
• يقوم هذا الغشاء بعكس أي ضوء يدخل إلى عينيه؛ مما يسمح للعين بجمع المزيد من الضوء المتاح.

» Comparison between night vision in human and fishing cat:

Night Vision in Humans	Night Vision in Fishing Cats
• Humans have poor night vision. • Humans would need a device called night vision goggles to see in the dark.	• Fishing cat has excellent night vision. • Fishing cat has a structural adaptation in its eyes that allows it to hunt in the dark.
 • رؤية الإنسان الليلية ضعيفة. • قد يحتاج الإنسان إلى نظارات الرؤية الليلية للرؤية في الظلام.	 • رؤية القط السمك الليلية خارقة. • يمتلك القط السمك تكيفاً تركيبياً في العينين يُمكنه من الصيد في الظلام.

Differences Between Humans and Nocturnal Animals

» A nocturnal animal can see **better than** humans in dim light.

• ترى الحيوانات الليلية بشكل أفضل من الإنسان في أضعف درجات الضوء.

	Humans	Nocturnal animal
	 Pupil	 Pupil
Eye size	Smaller eyes	Bigger eyes
Eye pupil	Opens narrower	Opens wider

Give a reason for:

- The pupils of the eyes of nocturnal animals open wider than the pupils of human eyes.
 - To allow more light to enter their eyes so they can see well at night.

Night Vision in Nocturnal Animals

» In the weakest light levels (dim light):

Many nocturnal animals can see their surroundings well.

» In complete darkness:

They depend on other senses, such as hearing, and smell.



- The eye pupil controls the amount of light entering the eye.
- Not all nocturnal animals have excellent night vision, such as bats.



Check your understanding?

» Put (✓) or (x):

1. All nocturnal animals have excellent night vision. ()
2. Both humans and animals need a light source to see. ()

Activity 3 What Do You Already Know About Light and Sight?

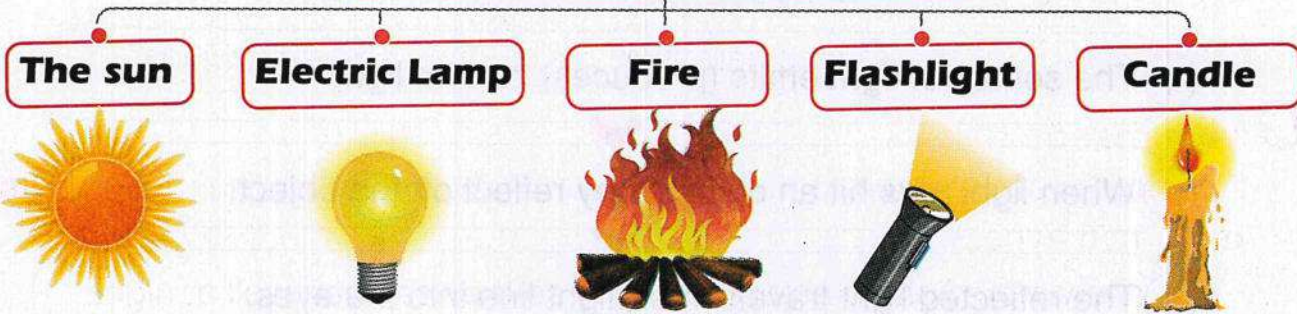
» Humans need a **source of light** to see objects clearly.

Source of Light

It's something that emits (gives off) its own light.

مصدر الضوء: الشيء الذي ينبعث منه ضوءه الخاص.

Examples of light sources:



Give a reason for:

• The moon and the mirror are not considered sources of light.

– Because they don't emit (produce) their own light where,

the moon reflects the sunlight falling on it.



the mirror reflects any light falling on it.



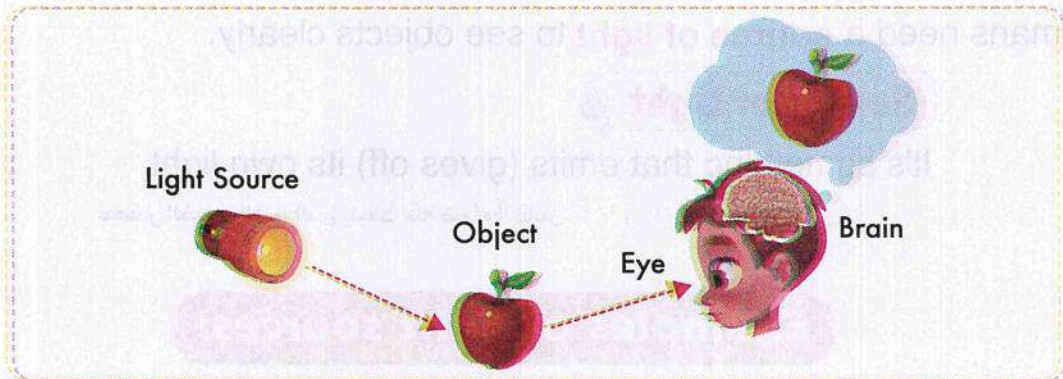
• القمر والمرآة لا يعتبران من مصادر الضوء؛ لأنهما لا يشعان ضوءهما الخاص:

– يعكس القمر ضوء الشمس الساقط عليه. – تعكس المرآة أي ضوء ساقط عليها.

Light is a visible form of energy that travels in the form of waves.

الضوء هو أحد مصادر الطاقة المرئية التي تنتقل على شكل موجات.

How Do We See?



- 1 The source of light emits (produces) its own light.
- 2 When light rays hit an object, they reflect off the object.
- 3 The reflected light travels in straight line into the eyes.
- 4 Special nerves in the eyes send messages to the brain.
- 5 The brain translates this information and tells you what you see.



NOTES:

- Vision happens due to light reflection.
- Without bouncing light off objects in our eyes, everything seems black.



Check your understanding?

» Put (✓) or (X):

- 1 Eyes are considered organs of light. ()
- 2 The moon is a source of light, as it appears shiny in the sky at night. ()

Source of light	مصدر الضوء	Reflect	ينعكس	Interprets	يعالج
Emits = Produce	يصدر	Straight line	خط مستقيم	Translates	يترجم

Lesson One

Answered

1 Choose the correct answer:

1.  Light is a form of

- (a) force (b) matter (c) energy (d) work

2. Which of the following organs work together to enable you to see different objects?

(Kafir El-Sheikh 2022)

- (a) Ears and brain. (b) Eyes and brain.
(c) Nose and brain. (d) Tongue and brain.

3. The eyes of glow in the dark.

(Cairo 2023)

- (a) human (b) bat (c) owl (d) fishing cat

4. have an excellent night vision for hunting.

(Dakhlia 2023)

- (a) Cat and bat (b) Owl and jerboa
(c) Owl and bat (d) Owl and cat

5. The pupils of nocturnal animals' eyes open those of humans' eyes.

- (a) wider than (b) similar to
(c) narrower than (d) typical to

(Giza 2023)

6. Which structural adaptation allows cats to have excellent night vision?

- (a) Night vision goggle. (b) Mirror-like membrane.
(c) Large eyes. (d) Absence of eye pupil.

7. The mirror-like membrane at the back of a cat's eyes any light falling on it.

- (a) refracts (b) absorbs (c) reflects (d) scatters

8. A human can use to be able to see in the dark without more light.

- (a) special glasses (b) night vision goggles
(c) magnifying lens (d) binoculars

9. In complete darkness, many nocturnal animals can detect the environment by all the following senses, except their sense.

- (a) hearing (b) touch (c) sight (d) smell

10. Each of the following is considered a source of light, except the

- (a) fire (b) sun (c) lamp (d) eye

(Cairo – Alex. – Azhur 2024)

11.  Among natural sources of light is the

- (a) lamp (b) moon (c) candle (d) sun

12. Which is the correct sequence that represents the vision process?

- (a) Object → eye → light (b) Eye → object → light
(c) Light → eye → object (d) Light → object → eye

2 Put (✓) or (X):

1. Humans need a source of light to see clearly in the dark. (Giza 2024) ()
2. The human eyes can see in the dark clearly. (Giza 2023) ()
3. Both humans and animals need a light source to see. (Dakhila 2023) ()
4. Cats have excellent night vision, while bats do not. (Cairo 2023) ()
5. The fishing cat can't hunt in the dark. (Dakhila 2023) ()
6. A human has excellent night vision better than that of a fishing cat. (Suez 2024) ()
7.  Nocturnal animals have larger eyes than humans. (Damietta 2024) ()
8. Most nocturnal animals can see better than humans at night. ()
9. Humans can see in dim light better than in bright light. ()
10. Humans and cats are similar in their ability to see at night. ()
11. Both owls and cats have excellent night vision. ()
12. The human eye can see objects because it emits its own light. ()
13. Eyes are considered sensory organs of light, not a source of light. (Beni-sulf 2023) ()
14.  The sun and the moon are natural sources of light. ()
15. The moon is considered a reflecting surface, like a mirror. ()
16. Light is an invisible form of energy. ()

3 Correct the underlined words:

1. The energy that enables human to see is sound energy. (Minia 2022) (.....)
2. The eyes of the owl seem to glow in the dark. (.....)
3. The fishing cat has poor night vision. (.....)
4. In a dark room, a girl can reach a table, depending on sight. (.....)
5. Vision occurs due to the refraction of light. (.....)
6. The moon is a natural source of light. (Giza 2023) (.....)

4 Write the scientific term:

1.  It is the organ affected by light and responsible for vision. (Port Said 2025) (.....)
2.  They are objects that emit their own light. (Cairo 2023) (.....)
3.  It is a device that a human can depend on to see in the dark. (Cairo 2023) (.....)
4.  It is a structural adaptation in the eye, which helps cats in hunting at night. (Azhar 2023) (.....)
5. It is a wild cats whose eyes seem to glow at night. (.....)
6. It is the visible form of energy that enables us to see. (Cairo 2023) (.....)

5 Complete the following sentences:

1. have an excellent night vision, but have a poor night vision.
2. Both and reflect the light falling on them.
3. The eye is the sensory organ that is affected by
(Kafr El- Sheikh 2023)
4. The form of energy that can be seen is energy. (Alex. 2024)

5. Existence of a thin layer that seems like a mirror in nocturnal animals eyes is an example of adaptation. (Azhar 2023)
6. Humans can use to see in the dark. (Dakahlia 2023)
7. All cats have at the back of their eyes. (Dakahlia 2023)
8. The pupils of eyes of nocturnal animals usually open than pupils of a humans eyes. (Dakahlia 2023)

6 Cross out the odd word:

1. Fishing cat – Owl – Dolphin – Bat (Azhar 2023) (.....)
2. Fishing cat – Bat – Panther chameleon – Owl (.....)
3. Flashlight – Moon – Fire – Candle (Red Sea – Dakahlia 2024) (.....)

7 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. The moon	a) can help human to see in the dark.
2. The sun	b) is inspired by the echolocation of bats.
3. Night vision goggles	c) is a natural source of light. (Giza 2023)
4. Blind person special cane	d) is shiny but not considered a source of light. (Giza 2023)

1. 2. 3. 4.

8 Which of the following figures represents the correct vision in humans?

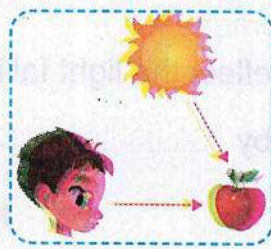


Figure (1)

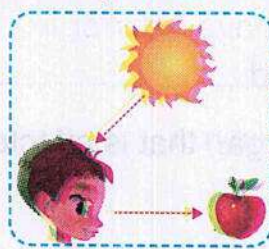


Figure (2)

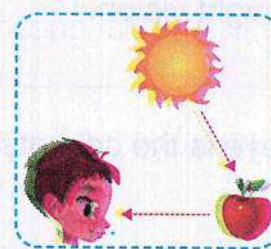


Figure (3)

9 Study the following figures, then complete:



Figure (1)



Figure (2)



Figure (3)



Figure (4)

1. The animal in figure (.....) has poor night vision, while the animal in figure (.....) has excellent night vision.
2. The function of the tool in figure (.....) looks like the membrane in the animal in figure (.....).
3. Both the object in figure (4) and the eye of the animal in figure (3) the light falling on them.

10 Give a reason for:

1. Cats' eyes seem to glow in the dark. (Giza 2023)
.....
2. The eyes of humans do not glow like cats in the dark. (Cairo 2023)
.....
3. The ability of some animals to see in the dark. (Red Sea 2023)
.....
4. Electric lamps are considered light sources.
.....
5. The moon appears bright although it is not a source of light. (Matrouh 2025)
.....

11 What happens if:

1. The fishing cat doesn't have a mirror-like membrane?
.....
2. A human's eyes have a mirror-like membrane, like fishing cats?
.....
3. Sunlight falls on the moon?
.....

Lesson

2

Activity 4 Light Reflection

» In this activity, you will learn how light interacts with different materials.

Step:

Direct the light of a flashlight on the following objects:



Observations:

- **Shiny (smooth) materials**, such as **mirrors** and **metals**, reflect **most** of the light rays that fall on them.

- **Rough materials**, such as **wood**, **clothes**, **plastic** and **papers**, reflect a **small** amount of the light rays that fall on them.

Conclusions:

- Shiny (smooth) materials reflect light **better than** rough materials.
- **Light reflection** is the bouncing of light rays when they fall on a reflecting surface.



Check your understanding?

» Put (✓) or (X):

- 1 A wooden spoon reflects light better than a metallic spoon. ()
- 2 Light reflection depends on the smoothness of the surfaces of objects. ()

Activity 5 Light Strikes Matter

Interaction of Light with Matter

» Light is a form of energy that travels in **straight lines** in the form of **light waves**.

• الضوء إحدى صور الطاقة، وينتقل في خطوط مستقيمة على شكل موجات ضوئية.

When light falls on an object,

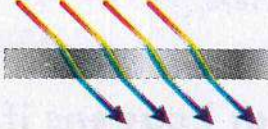
some light may be absorbed by the object.

يتمص الجسم بعض الضوء.



some light may pass through the object.

يمر بعض الضوء عبر الجسم.



some light may be reflected off the object.

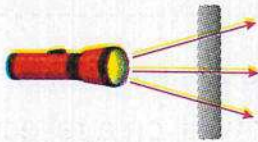
يعكس الجسم بعض الضوء.



Objects are classified into:

Transparent Objects:

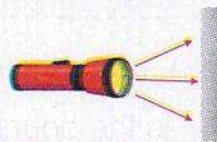
الأجسام الشفافة



- They are the objects that **allow** light to pass through.
- Things **can** be seen through them.
- They **don't cast** shadows.

Opaque Objects:

الأجسام المعتمة



- They are the objects that **don't allow light** to pass through.
- Things **can't** be seen through them.
- They **cast** shadows.

Examples:

Air – Water – Glass – Lenses – Window

Human body – Wood – Metals

Give a reason for:

- A shadow is formed when light falls on an opaque object.

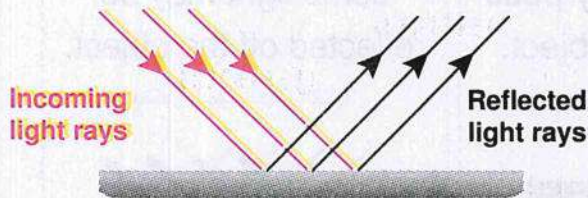
- Because the opaque object doesn't allow light to pass through, it absorbs some light and reflects the rest of the light energy off.



» Light reflection depends on the **smoothness** of surface; as follow:

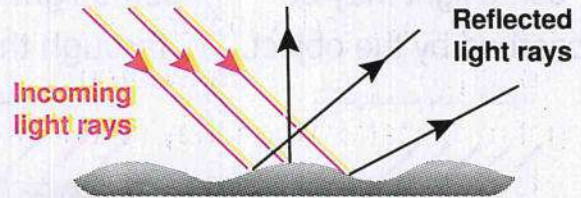
Smooth Surface

Such as a polished mirror



Rough Surface

Such as a painted surface



What happens if:

- Light falls on a smooth surface?

- Light rays would be reflected in **one direction** with the **same angle** at which they hit the surface.

• عندما يسقط الضوء على سطح ناعم، تنعكس أشعة الضوء في اتجاه واحد، وبنفس الزاوية التي سقطت بها الأشعة على السطح.

- Light falls on a rough surface?

- Light rays would be scattered (diffused) in **different** directions.

• عندما يسقط الضوء على سطح خشن، تنتشت أشعة الضوء في اتجاهات مختلفة.



Check your understanding?

» The mobile phone has fallen, and its screen has broken. How will light reflect through this screen after it is broken?



Lesson Two

Answered

1 Choose the correct answer:

1.  The process of vision occurs as a result of the of light.
 (a) scattering (b) refraction (c) absorption (d) reflection
2.  Light travels in lines. (Giza 2023)
 (a) curved (b) straight (c) circular (d) zigzag
3. All of the following are transparent objects, except (Dakhila 2023)
 (a) glass (b) water (c) paper (d) air
4. All of the following are opaque objects, except (Giza 2023)
 (a) wood (b) water (c) carton (d) a human body
5. Carton, paper, and wood are materials. (Alex. – Giza 2023)
 (a) opaque (b) transparent (c) liquid (d) gaseous
6. Light rays scatter when they reflect off (Azhar 2023)
 (a) lenses of eyeglasses (b) a metallic surface
 (c) a mirror (d) a wooden board
7. is a light reflecting material. (Cairo 2022)
 (a) Wood (b) Mirror (c) Plastic (d) Paper
8. Which of the following allows light to pass through? (Giza 2022)
 (a) Rock. (b) Moon. (c) Wood. (d) Glass.
9.  When light falls on a mirror, it is
 (a) absorbed (b) refracted (c) reflected (d) scattered
10. When light falls on a dark surface, (Dakhila 2022)
 (a) the surface absorbs the light (b) light passes through it
 (c) the light is refracted (d) nothing happens
11. absorbs some of the light falling on it and reflects others.
 (a) Water (b) Glass (c) Wood (d) Air
12.  Which of the following materials reflect light best?
 (a) Wood. (b) Mirror. (c) Cloth. (d) Rock. (Cairo 2025)

13.  If Hossam wants to make a box to see its contents from the outside, which of the following materials can he use?

- (a) Cardboard. (b) Opaque plastic.
(c) Transparent glass. (d) Carton.

14. surfaces scatter and diffuse light rays.

- (a) Shiny (b) Smooth (c) Painted (d) Polished

2 Put (✓) or (X):

1. Light travels in straight lines. (Alex. 2023) ()
2. Light reflection depends on the smoothness of the surfaces of objects. (Azhar 2023) ()
3. Transparent objects don't allow light to pass through. (Alex. 2024) ()
4. If I can see my face clearly on a surface, this means that it is a smooth, shiny surface. (Qalyobia 2023) ()
5. Wood is a transparent object that allows light to pass through. (Assuit & Azhur & Cairo 2023) ()
6.  Objects can be seen due to the absorption of light. (Dakahlia 2023) ()
7. When light rays strike an opaque object, it absorbs all of these rays. ()
8. Glass is a transparent material. (Alex. 2025) ()
9.  Rough objects reflect light better than smooth ones. (Cairo 2025) ()
10. A wooden board reflects less amount of light than a mirror. ()
11. Light travels in the form of waves. ()

3 Correct the underlined words:

1. A piece of cloth is considered a smooth surface. (.....)
2. Air is a transparent liquid material. (.....)
3. Air and water are opaque materials. (.....)
4. When light falls on a piece of wood, a large amount of light is reflected. (.....)
5. The mirror-like membrane in the cat's eyes is considered a rough surface. (.....)

6. A mirror reflects some of the light falling on it. (.....)

4 Write the scientific term:

1. They are materials which allow light to pass through.

(Qalyobia - Ismailia - Assuit 2023) (.....)

2. They are materials that don't allow light to pass through. (.....)

3. It is a type of surface that reflects light in different direction.

(Cairo 2023) (.....)

4. They are materials through which objects can't be seen. (.....)

5 Complete the following using the words between the brackets:

(a shadow – an opaque – transparent – bounces – straight – one – lenses)

1. The human body is considered as object.

2. Light travels in lines. (Alexandria 2024)

3. When light falls on an object, the light off so we can see this object.

(Dakahlia 2023)

4. When light falls on an opaque object, is formed.

(Dakahlia 2023)

5. You can see an object through objects such as

6. Smooth surfaces reflect light in direction.

(Cairo 2023)

6 Cross out the odd word:

1. Wood – Glass cup – Book – Wax

(Cairo 2023) (.....)

2. Air – Water – Wood – Glass

(Dakahlia 2023) (.....)

3. Mirror – Wood – Paper – Rock

(.....)

7 Classify the following materials into transparent and opaque materials:

(Suez 2023 – Dakahlia 2023)

1. A wooden chair.

(.....)

2. An aluminum pot.

(.....)

3. Air.

(.....)

4. Glass.

(.....)

5. Rock.

(.....)

8 Classify the following materials in these tables below:

1. Rock – Glass – Window – Wood – Skin – Milk – Clear water

Transparent Mediums	Opaque Mediums
_____	_____

2. Mirror – Cloth – Metal – Wood – Paper

Smooth Surfaces	Rough Surfaces
_____	_____

9 Choose from column (A) what suits it in column (B):

A

Column (A)	Column (B)
1. A polished surface	Ⓐ is a source of light.
2. A painted surface	Ⓑ reflects falling light rays in one direction, such as metals.
3. A shadow	Ⓒ diffuses falling light rays in different directions, such as paper.
4. Candle	Ⓓ is formed when the light strikes a human body.

(Giza 2023)

1. 2. 3. 4.

B

Column (A)	Column (B)
1. Mirror	Ⓐ reflects light in different directions. (Qalyobia 2024)
2. The lens of a camera	Ⓑ reflects light in one direction. (Qalyobia 2024)
3. A cardboard	Ⓒ is made of a transparent material such as glass. (Giza 2023)

1. 2. 3.

10 Answer the following questions:

(Alex. – Sharkia – Fayoum – Mansoura 2022)

1. Look at the path of the light rays in figures (A) and (B), then determine which of the two figures is opaque and which is transparent?



Figure (A)

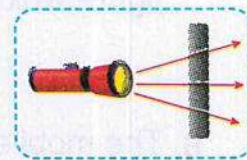


Figure (B)

- (a) Figure (A) is
(b) Figure (B) is

2. Which of the opposite surfaces represents the reflection of light rays from a wooden surface, and what is the reason?

(Cairo 2025)

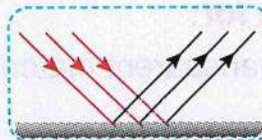


Figure (A)

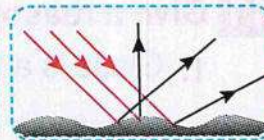


Figure (B)

3. Your friend wants to prevent the light from entering his room. Suggest to him some materials that he can use on the window to prevent light from entering his room.

(Cairo 2023)

4. Look at the following figures, then choose the correct answer:



Cardboard



Steel bottle

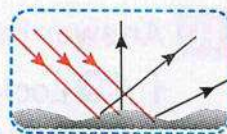


Empty glass cup

- (a) You can see the water when you put it inside the
(steel bottle – empty glass cup)
- (b) The is considered an opaque object.
(cardboard – empty glass cup)
- (c) When you put the in front of a flashlight, a shadow is formed.
(steel bottle – empty glass cup)

5. When the light falls on the surface, it reflects as in the opposite figure, which means that the type of this surface is

(Menoufia 2024)



6. The mobile phone fell and its screen broke. How will light reflect through this screen after it is broken?

(Dakahlia 2024)



11 Give a reason for:

1. Glass is a transparent material.

(Alex. 2024)

2. Wood is an opaque material.

(Alexandria 2024)

3. A shadow is formed when light falls on an opaque object.

(Dakahlia 2023 – 2024)

4. You can see an object placed behind a glass cup or lens.

(Qalyubiya & Dakahlia 2023)

5. None of the light energy passes through the opaque objects.

(Alex. 2023)

6. A mirror reflects light better than a painted surface.

(Giza 2023)

12 What happens if:

1. You place an opaque object between a light source and a wall?

(Ismailia 2023)

2. Light falls on a smooth surface, such as a mirror?

(Red Sea 2023)

3. Light falls on a rough surface, such as wood or paper?

13 Compare between transparent objects and opaque objects.

(Dakahlia 2025)

Activity 6 Firefly Light Show

Look at the following figures, then tick on the correct answer:

These organisms produce light up to

☐ play

☐ communicate



Fireflies

Fireflies



1 They live on **mangrove trees** in Thailand.

2 They are a type of insects called **winged beetles (not flies)**.

3 Fireflies produce a **chemical reaction** inside their bodies that allows them to **light up** to communicate together.

4 Fireflies depend on their sense of **sight** to communicate together.

- 1 تعيش بالقرب من أشجار المانجروف في تايلاند.
- 2 نوع من الحشرات يسمى الخنافس المجنحة (ليس الذباب).
- 3 يحدث تفاعل كيميائي داخل أجسام الخنافس يمكنها من الإضاءة للتواصل فيما بينها.
- 4 تعتمد على حاسة البصر للتواصل.

Give a reason for:

- Fireflies use their wings to make different flash patterns in regular periods of time.
 - To warn other fireflies of predators.
 - To attract a mate to reproduce.



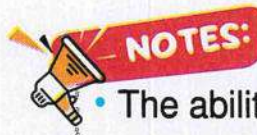
- تستخدم الخنافس المضيئة أجنحتها لعمل أنماط وميض مختلفة في فترات زمنية منتظمة:
 - لتحذير الخنافس المضيئة الأخرى من الحيوانات المفترسة.
 - لجذب الجنس الآخر للتكاثر.

What happens if:

• There is another group of fireflies flashing nearby?

- Fireflies will stop flashing their own patterns.
- Fireflies will start to match the pattern of the other group to communicate together.

ماذا سيحدث لو: كانت هناك مجموعة خنافس مضيئة أخرى بالقرب منها؟
• ستتوقف عن النمط الذي تومض به، ثم تقلد نمط المجموعة الأخرى للتواصل معها.



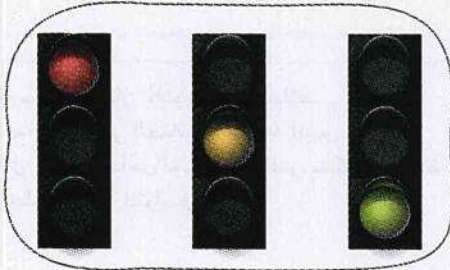
- The ability of fireflies to light up is considered a **structural adaptation**.
- Changing the flash pattern in fireflies is considered a **behavioral adaptation**.

• قدرة الخنافس المضيئة على إضاءة أجسامها تعتبر تكيفاً تركيبياً.

• تغيير نمط الوميض في الخنافس المضيئة يعتبر تكيفاً سلوكياً.

A human can also use light to communicate and to transfer information, such as using:

Traffic lights



Lighthouses



• يمكن للإنسان أيضاً استخدام الضوء للتواصل ونقل المعلومات، مثل: استخدام إشارة المرور، ومنارات السفن.



Check your understanding?

» Put (✓) or (X):

- 1 Fireflies light up to warm their bodies in the winter. ()
- 2 Displaying light is a kind of communication in a human and in fireflies. ()

Activity 7 What Do You Already Know About Communication and Information Transfer?

» Put (✓) or (X):

- 1 Both bats and dolphins depend on echolocation to communicate. ()
- 2 A human can't communicate with light. ()

» There are some **similarities** and **differences** between a human and animals in terms of communication and transferring information.



Human

- Writing
- Reading
- Language
- TV - Cell phones
- An electronic reader

Both

- Displaying light
- Producing sounds
- High-pitched sounds
- Low-pitched sounds

Animals



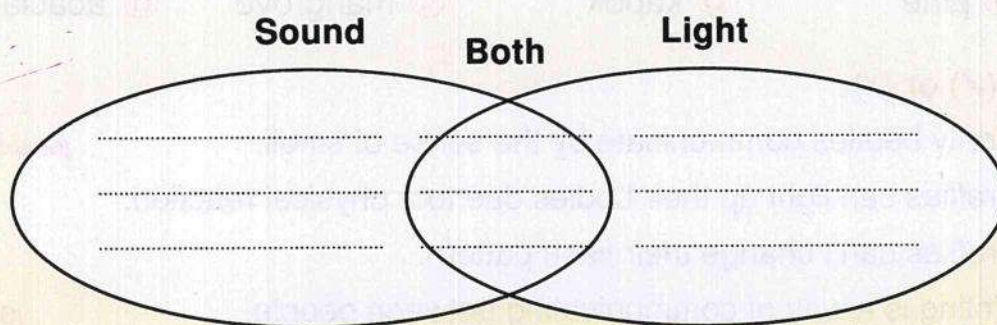
- Echolocation



Check your understanding?

» Use the following living organisms to fill the gaps:

Human - Humpback whale - Firefly - Monogoose



Lesson Three

Answered

1 Choose the correct answer:

1. produce a chemical reaction inside their bodies to light up.
 (a) Fish (b) Fireflies
 (c) Frogs (d) Ants (Azhar 2023)
2. A firefly is not a bird but it is a type of
 (a) insects (b) lizards
 (c) reptiles (d) flies (Suez 2024)
3. Changing the pattern of lighting up in a firefly is an example of
 adaptation(s). (Qalyobia 2023)
 (a) structural and behavioral (b) physical and behavioral
 (c) only structural (d) only behavioral
4.  Fireflies can communicate with each other through
 (a) smell sense (b) smell (c) light (d) songs
5. Animals communicate with each other through
 (a) writing (b) reading
 (c) talking (d) sound and light (Giza 2022)
6.  Man uses to communicate.
 (a) echolocation (b) sight and hearing
 (c) camouflage (d) sleeping
7.  Fireflies use their to release flashes.
 (a) eyes (b) head (c) wings (d) ears
8.  Fireflies are found on trees.
 (a) pine (b) kapok (c) mangrove (d) acacia

2 Put (✓) or (X):

1. Firefly beetles communicate by the sense of smell. (Matrouh 2025) ()
2. Fireflies can light up their bodies due to a physical reaction. ()
3. Fireflies can't change their flash pattern. ()
4. Writing is a way of communicating between people. (Gize 2023) ()

5. Sound and light are common methods of communication between humans and animals. (Monufia 2024) ()
6. Echolocation is a method of communication between bats. ()
7. Watching TV is a type of communication between animals. ()
8. Both people and animals can use high-pitched sounds to communicate. ()

3 Correct the underlined words:

1. Fireflies use their tails to form different flash patterns. ()
2. Fireflies are wingless beetles. ()
3. The ability of fireflies to light up their bodies is a behavioral adaptation. ()
4. Fireflies can be found in the same habitat as acacia trees. ()

4 Complete the following sentence:

- They are winged beetles that can light up their bodies to communicate. ()

5 Complete the following using the words between the brackets:

(predator – chemical reaction – sight – light – mate – Mangrove – wings)

1. Fireflies use their sense of to communicate. (Cairo 2023)
2. Fireflies light up their bodies to attract a to reproduce or to warn others off a
3. Fireflies are found on trees in Thailand.
4. Fireflies produce inside their bodies that allows them to light up. (Dakahlia 2023)
5.  Fireflies communicate with each other through energy. (Mansoura 2023)
6.  Fireflies use their to release flashes of light.

6 Cross out the odd word:

1. Bats – Fireflies – Dolphins – Humpback whales ()
2. Reading – Writing – Echolocation – Phone calls ()
3. Traffic lights – Car horns – Ambulance siren – Radio ()

7 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Watching TV	Ⓐ produce flash lights to attract a mate.
2. Fireflies	Ⓑ produce high-pitched sounds for mating.
3. Humpback whales	Ⓒ is a type of communication for human only. (Qalyubia 2023)
4. Ants	Ⓓ depend on the sense of smell only to communicate.

1. 2. 3. 4.

8 Study the following figures, then choose:



Figure (1)



Figure (2)



Figure (3)

- The insects in figure (2) communicate with each other by producing
(songs – light – heat)
- The animal in figure (1) and the human can use the sense of
to communicate. (sight – smell – hearing)
- When you use the device in figure (3) to communicate with your friend, you depend on the sense(s) of
(sight only – hearing only – both sight and hearing)
- If the of the insect in figure (2) are broken, they can't change their flash pattern.
(legs – wings - eyes)

9 Give a reason for:

- Fireflies emit flash lights.

(Cairo 2025)

2. The occurrence of a chemical reaction inside the bodies of fireflies.

.....

.....

10 What happens if:

1. Fireflies do not emit flashes?

.....

.....

2. A predator gets closer to a group of fireflies?

.....

.....

3. A firefly wants to attract a mate to reproduce?

(Cairo 2023)

.....

.....

11 Mention an example of behavioral adaptation in fireflies.

.....

.....

.....

.....

12 Mention one benefit of the flashes emitted by fireflies.

.....

.....

.....

.....

Lesson

4

Activity 8 Transferring Information

» We use our senses of sight, touch, taste, hearing, and smell to:

- 1 Collect information about the environment around us.
 - 2 Communicate or share information with others.
- Your **ears** detect **sound** energy.
 - Your **eyes** detect **light** energy.

Examples of Information that the Eyes Receive

- 1 You see your friend waving.



رؤية صديق يلوح لك بيده.

- 2 You stop the car when you see a red traffic light.



إيقاف السيارة عند رؤية إشارة المرور حمراء.

- 3 Using a rescue flare to get help.



استخدام شعلة إنقاذ لطلب المساعدة.

- 4 Hikers use mirrors that flash to attract the attention of rescue helicopter pilots.



استخدام المرايا لجذب انتباه طائرات الهليكوبتر لإنقاذهم.

NOTE:

- In the past, humans used **signal fires** to communicate from a distance of many kilometers.

• اعتاد الناس قديمًا إشعال النار واستخدامها للتواصل على مسافات طويلة.

Codes and Trasfering Information

» Humans use codes to transmit information.

يستخدم الإنسان الشفرات في نقل المعلومات.

Code

It is a pattern that has a meaning.

الشفرة: هي نمط له معنى.

1 Thumbs-up or Thumbs-down:



Thumb up
means **good**.



Thumb down
means **bad**.

رفع الإبهام لأعلى أو خفضه لأسفل.

2 Facial expressions:

They are codes that help people predict what we feel or think.



Happy



Sad



Angry

تعبيرات الوجه تساعد الناس على معرفة ما نشعر به.

3 Language:

- Language is a code in the form of **sound** that transfers information.
- Different languages have different codes.



• اللغة هي وسيلة للتواصل في شكل طاقة صوتية لنقل المعلومات.
• اللغات المختلفة لها شفرات مختلفة.

4 Writing:

It is a code in the form of **symbols** or **arranged letters** giving a specific meaning.



الكتابة في شكل رموز أو حروف مرتبة تعطي معنى محدداً.

5 Traffic lights:



Red means
"Stop".



Green means
"Go".

إشارة المرور.

6 Lighthouses:

They encode information in flashes of light to tell sailors where they are.



تقوم المنارات بإرسال رسائل (ومضات ضوئية) للبحارة في السفن.

7 Music or sounds:

Many musical instruments can be used to transfer information in the form of a code.



يمكن استخدام الموسيقى أو الطبول في إرسال الرسائل.

- Sense organs receive information and send it to the brain.
- The brain **decodes** and **interprets** the meaning of this code.

• تستقبل أعضاء الحس لديك هذه المعلومات وترسلها إلى المخ.

• يفك المخ تلك الشفرات ويفسر معناها.



Check your understanding?

» Put (✓) or (X):

- 1 A thumbs-down code means that you are angry. ()
- 2 The English and Arabic languages have similar codes. ()
- 3 Hikers could use night vision goggles to get help. ()
- 4 Code is a pattern that has no meaning. ()

Activity 9 Review: Communication and Information Transfer

» Classify the following communication systems by ticking (✓) in front of (animals, humans or both):

Communication Type	A Human	Animals	Both
1 Displaying light			✓
2 Writing			
3 Using drums			
4 Using a cell phone			
5 Using high-pitched sounds			
6 Using echolocation			
7 Language (Speech)			
8 Traffic lights			
9 Send special scents			
10 Lighthouses			
11 Using sounds			
12 Reading			
13 Producing chatters			
14 Thumb-up or down			

Lesson Four

Answered

1 Choose the correct answer:

1.  All the following are examples of codes, except (Alex. 2024)
 - (a) languages
 - (b) facial expressions
 - (c) writing
 - (d) swimming
2.  Raising the thumb up or lowering it down is a kind of
 - (a) colors
 - (b) codes
 - (c) waves
 - (d) lights

(Cairo – Azhur – Ismailia – Mansoura 2023)
3.  Reading and writing are common types of communication between
 - (a) humans
 - (b) animals
 - (c) birds
 - (d) plants

(Giza 2022)
4. When your eyes see a red traffic light, they send a signal to make you
 - (a) increase your speed
 - (b) decrease your speed
 - (c) keep your speed as it is
 - (d) stop at once

(Qalyubia 2023)
5. All the following depend on sound energy to communicate, except
 - (a) drums
 - (b) lighthouse
 - (c) languages
 - (d) musical instruments
6. Your is responsible for decoding the codes received from different sense organs.
 - (a) thumb
 - (b) brain
 - (c) language
 - (d) nerves
7.  Travelers use to attract the attention of helicopter pilots to rescue them.
 - (a) sound
 - (b) food
 - (c) wood
 - (d) mirrors

2 Put (✓) or (X):

1. Red and green traffic lights are codes. (Alex. 2025) ()
2. In order for the code to be translated, the brain must identify it. (Cairo – Dakahlia – Assuit 2023) ()
3. A thumbs-down code means "good". ()

4. Facial expressions are a code that can be received by the eyes. ()
5. A pilot of a rescue helicopter can detect a rescue flare by his ears. ()
6. The flash pattern produced by a firefly is a kind of codes. ()

3 Correct the underlined words:

1. Writing is a code in the form of sound that a human can use to communicate. (.....)
2. The tones of musical instruments can be detected by our eyes. (.....)
3. The English and Arabic languages have similar codes. (.....)
4. The brain encodes the information and understands it. (.....)
5. Seeing the yellow traffic light means you must stop. (.....)

4 Write the scientific term:

1. It is a pattern that has a meaning. (Cairo 2025) (.....)
2. It is the organ that decodes and interprets the information sent by the sensory organs. (.....)
3. It is a tool used by hikers to get the attention of rescue helicopter pilot. (.....)
4. It is the sense organ that detects the light energy. (Giza 2022) (.....)

5 Complete the following sentences:

1. Different languages are considered a type of
2. The are used to communicate over long distances.
3. The send flash codes to guide sailors.
4. Raising the thumb up is a type of

6 Cross out the odd word:

1. Rescue flare – Car horn – Fire alarm – Ambulance siren (.....)
2. Lighthouse – Fire signal – Car horn – Rescue flare (.....)

7 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Thump up	(a) is number of symbols that have a specific pattern.
2. Thump down	(b) helps you to predict the feelings of the person you are talking to.
3. Writing	(c) is a code that means that you say "no". (Qalyubia 2023)
4. A facial expression	(d) is a code that means that you say "yes". (Qalyubia 2023)

1. 2. 3. 4.

8 Study the following figures, then choose:



Figure (1)



Figure (2)



Figure (3)

- When the of a helicopter's pilot sees the smoke produced from the tool in figure (1), they send a signal to the to decode it.
 (a) ears - brain (b) eyes - spinal cord (c) eyes- brain
- In figure (2), a driver near the ambulance receives the sound of the siren by the sense of, while the flashlight is by the sense of
 (a) sight - hearing (b) hearing - smell (c) hearing - sight
- When the referee blows the whistle in figure (3), the players receive the code by their sense of
 (a) sight only (b) hearing only (c) both sight and hearing
- When the referee waves with his hand in figure (3), the players receive the code by their sense of
 (a) sight only (b) hearing only (c) both sight and hearing

9 Give a reason for:

1. Hikers carry a mirror during their trip.

2. Humans sometimes use codes.

3. Lighthouses are very important for sailors.

10 What happens if:

- Codes have no meaning?

11 What is meant by:

- Code?

12 Mention two examples of codes used by humans in their daily lives.

Theme

Matter and Energy

Unit

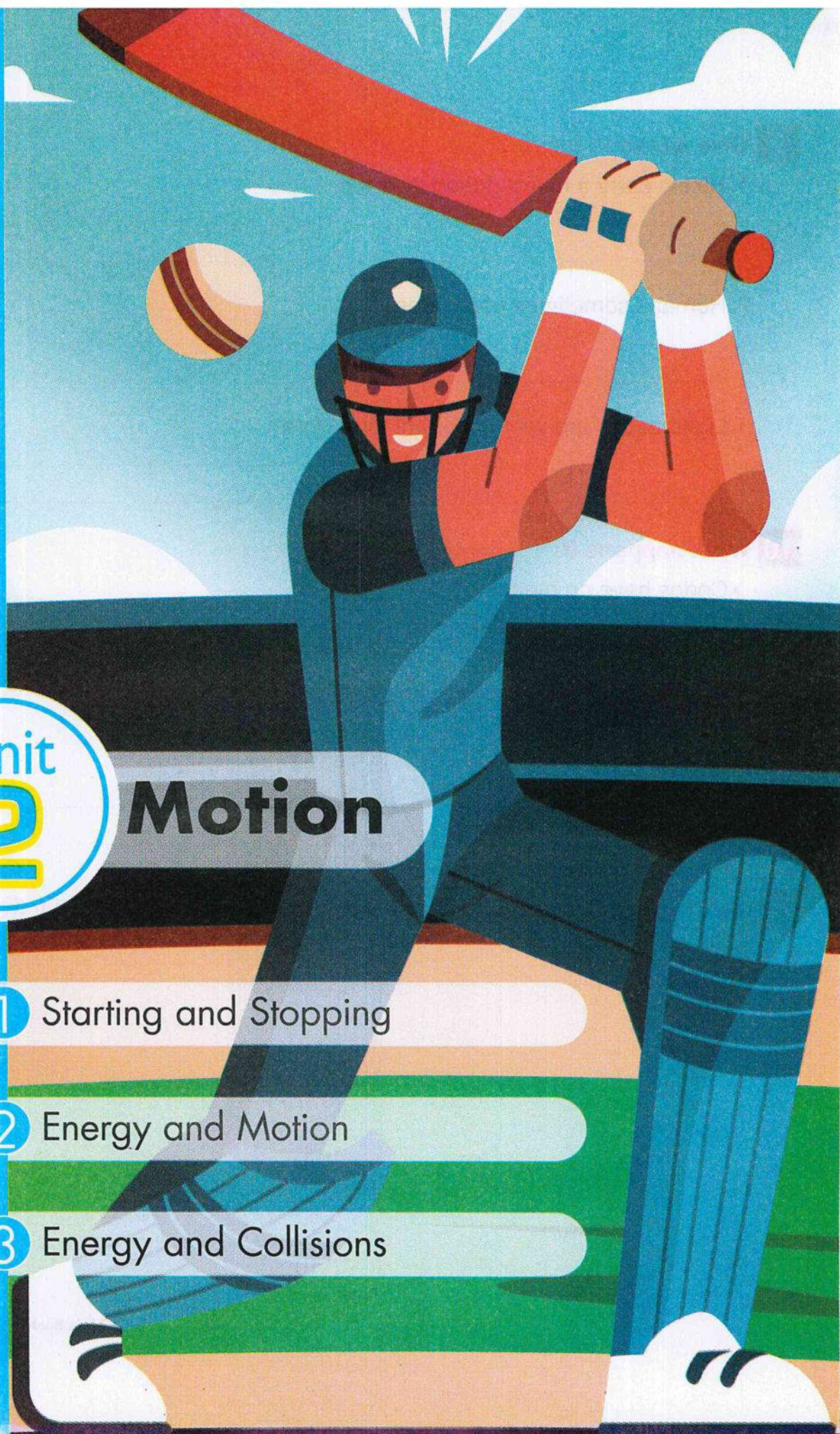
2

Motion

Concept 1 Starting and Stopping

Concept 2 Energy and Motion

Concept 3 Energy and Collisions



Get Started

What I Already Know

» In this unit, we will study the relationship between **energy** and **motion**.

The Relationship Between Energy and Motion

» Static objects move when a proper force acts on them.

For example, a static ball remains static until a player kicks it.

Example:

Look at this figure: the man is sitting in a wheelchair on the top of a ramp.

During moving down

The man **doesn't exert force** because the force of gravity pulls him down.

During moving up

The man needs to **exert more force** to overcome the force of gravity.



Motion of Cars and Trains:

» Trains and cars need a source of energy, such as fuel, to move.

» Heavy objects, such as trains, need more fuel than light objects, such as cars.

Science and Car Collisions:

» During collisions, we **hear noise**, and **objects get damaged**.

» Modern cars are designed with a lot of safety equipments, such as **seatbelts** and **airbags**, to reduce the negative effects of collisions on the driver or passenger.



Concept

2.1

Starting and Stopping



Concept 1

Starting and Stopping

Lesson 1

- | | |
|------------|-----------------------|
| Activity 1 | Can You Explain? |
| Activity 2 | Truck Versus Airplane |
| Activity 3 | Making Things Move |

Lesson 2

- | | |
|------------|---|
| Activity 4 | What Do You Already Know About Starting and Stopping? |
| Activity 5 | Objects in Motion |
| Activity 6 | Force |

Lesson 3

- | | |
|------------|-----------------|
| Activity 7 | Stopping Motion |
| Activity 8 | Rolling Cars |

- | | |
|-------------|----------------------------------|
| Activity 9 | Energy, Work, and Force |
| Activity 10 | Record Evidence Like a Scientist |

Glossary

Lesson (1)

Activity (1)

Static	ساكن	Force	قوة	Kick	يركل الكرة
Goal keeper	حارس مرمى	Move	يتحرك	Stop	يتوقف
Position	موضع	Motion	الحركة	Pushing force	قوة الدفع
Pulling force	قوة السحب	Cart	عربة	Refrigerator	ثلاجة

Activity (2)

Jet airplane	طائرة نفاثة	Truck	شاحنة	Powerful	قوي
Engine	محرك	Parachute	مظلة هبوط	Rocket	صاروخ
Speed	السرعة	Fitted	مثبت	Engineers	مهندسون
Design	تصميم				

Activity (3)

Air force	قوة الهواء	Leaves of trees	أوراق شجر	Fire extinguisher	طفاية حريق
Distance	مسافة				

Lesson (2)

Activity (4)

Balanced forces	قوى متزنة	Unbalanced forces	قوى غير متزنة	Tug-of-war	لعبة شد الحبل
Act on	تؤثر على				

Activity (5)

Starting point	موضع البداية	Throw	يرمي	Gravity	الجاذبية
Drop	تسقط	Blowing wind	هبوب الرياح	Revolution	دوران

Activity (6)

Constant	ثابت	Bag	حقيبة	Chair	كرسي
Table	منضدة				

Lesson (3)

Activity (7)

Opposite	معاكس	Direction	اتجاه	Friction force	قوة الاحتكاك
Collision	تصادم	Touching surfaces	أسطح متلامسة	Crash	يصطدم
Slow down	يبطئ	Stop	يتوقف		

Activity (8)

Gently	برفق	Hard	بقوة	Faster	أسرع
Slower	أبطأ				

Lesson (4)

Activity (9)

Energy	الطاقة	Flat road	طريق مستو	Work	الشفل
Transfer	تنتقل				

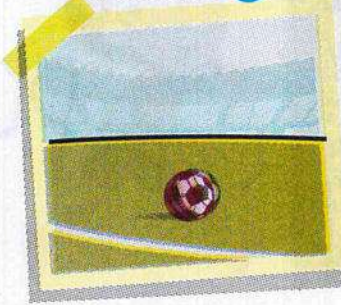
Lesson

1

Activity 1 Can You Explain?

A force is required to move or stop an object, where:

Picture 1



Picture 2



Picture 3



- 1 The ball in picture (1) stays static on the ground because there is no force acting on it.



- 2 The ball in picture (2) starts to move when the player kicks (pushes) it.



- 3 The ball in picture (3) stops when the goalkeeper pushes against it.

② تبدأ الكرة في الحركة عندما يركلها اللاعب.

① تظل الكرة ساكنة؛ لعدم وجود قوة تؤثر عليها.

③ تتوقف الكرة عن الحركة عندما يلتقطها حارس المرمى.

From the previous example, we can conclude that:

1

Static objects require a force to **move**.

2

Moving objects require a force to **stop**.

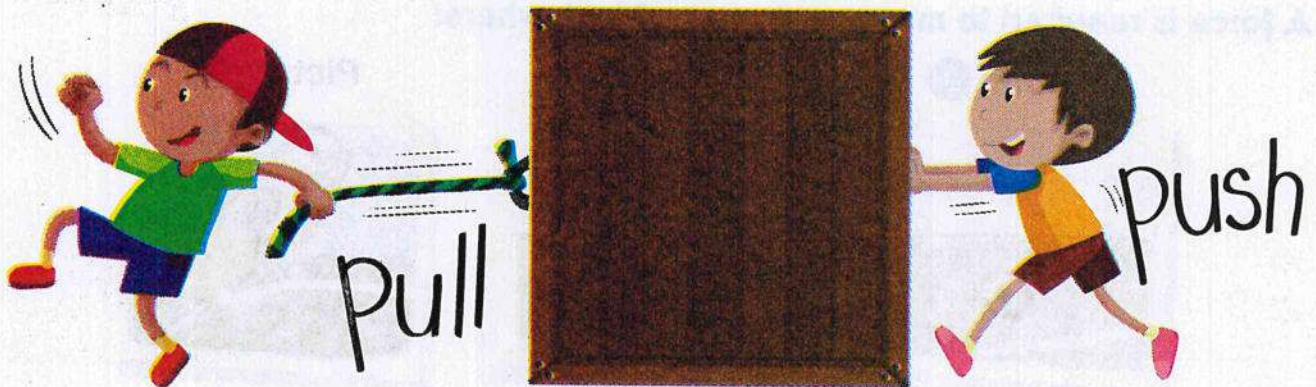
• من المثال السابق، يمكننا أن نستنتج ما يلي:

– تحتاج الأجسام المتحركة إلى قوة لإيقافها.

– تحتاج الأجسام الثابتة إلى قوة لتحريكها.

- » The object whose position doesn't change is called a **static object**.
- » The object whose position changes is called a **moving object**.

- We can say that an object is in a state of motion when its **position** changes.
- To move or stop an object, the forces acting on it must change.
- We need energy to apply **pushing** or **pulling forces**.



It is the force you can do to move an object **towards you**.

It is the force you can do to move an object **away from you**.



Check your understanding?

» Complete the following sentences using (push or pull):

1. The player needs to the ball to move it, while the goalkeeper needs to against the ball to stop it.



2. The girl needs to the cart to move it, while the boy needs to the suitcase to move it.



3. The man needs to the door of the refrigerator to open it.



Activity 2 Truck Versus Airplane

- » A jet airplane is **much faster** than a truck because the jet's engine is **much more powerful** than the truck's engine.



Jet Airplane



Truck

تطير الطائرة بسرعة أكبر من الشاحنة؛ لأن محرك الطائرة أقوى بكثير من محرك الشاحنة.

The Shockwave Truck

- » It is one of the fastest and most powerful trucks in the world.
» Shockwave is about **five times** faster than normal truck.



• تلك الشاحنة أسرع من الشاحنة العادية 5 مرات تقريبًا.

• تعتبر من أسرع وأقوى الشاحنات في العالم.

How Does It Move?

- It contains **three jet engines**.
- The pushing force of its powerful engines makes it reach speeds more than **500** kilometers per hour.



• زُوِّدَتْ تلك الشاحنة بـ 3 محركات لطائرة نفثة.

• تساعد قوة دفع المحركات القوية الشاحنة في أن تصل لسرعات كبيرة قد

تتعدى 500 كيلومتر في الساعة.

How Does It Stop?

- Engineers install **three parachutes** in it and the driver open them to slow down the Shockwave quickly.
- The idea of parachutes is used in rocket designs.



• قام المهندسون بتركيب 3 مظلات يفتحها السائق لإبطيء الشاحنة بمعدل

أسرع.

• تُستخدم فكرة المظلات في تصميم الصواريخ.

Check your understanding?

» Put (✓) or (X):

1. A normal truck is slower than a jet airplane. ()
2. Parachutes are used to increase the speed of the shockwave truck. ()

Activity 3 Making Things Move

» Put (✓) or (X):

1. A static ball on the ground doesn't move until your foot pushes it. ()
2. A closed drawer doesn't open until you pull it. ()

Can air provide enough force to move objects?

- » Air can provide enough force to move some objects, such as the blowing wind that can move the leaves of a tree.



How did engineers prove that the air causes movement?



- Engineers fixed a fire extinguisher onto cart.
- When air is released **backward** from the extinguisher, the cart begins to move **forward**.
- By **increasing** the number of fire extinguishers, the speed of the cart **increases**, and it covers a **longer** distance.

- ثبت المهندسون طفاية حريق على عربة ساكنة.
- عندما تنبعث الغازات من طفاية الحريق إلى الخلف، تبدأ العربة في التحرك إلى الأمام.
- عند زيادة عدد طفايات الحريق، تصبح العربة أسرع وتقطع مسافة أطول.



Check your understanding?

» Put (✓) or (X):

1. The blowing wind can move the leaves of a tree. ()
2. Air has no force. ()

Lesson One

Answered

1 Choose the correct answer:

1. You need to apply a on a car to make it move.
 (a) force – energy (b) energy – force (c) energy – food (d) force – light
2. Push or pull actions are considered types of (Giza 2023)
 (a) force (b) devices (c) energy (d) adaptation
3. When you move something towards you, this represents
 (a) pushing force (b) light energy (c) pulling force (d) sound energy
 (Cairo – Qalyobia 2023 / Suez 2024)
4. When you move something away from you, this represents
 (a) pushing force (b) light energy (c) pulling force (d) sound energy
 (Alex. 2025)
5. To open a closed drawer, we use a force.
 (a) friction (b) gravitational (c) pulling (d) pushing
6. The force that is used to kick a ball with your foot is
 (a) a pull (b) a push (c) sound (d) light
 (Port Said – Menofia 2023)
7. All the following motions represent a pushing force, except
 (a) throwing a ball in the air (b) typing on the keyboard
 (c) putting your socks on (d) pressing on the door bell
8. All the following motions represent a pulling force, except (Cairo 2022)
 (a) kicking a ball
 (b) wearing your socks
 (c) lifting up a bag from the ground
 (d) opening a closed drawer
9. If the speed of a Shockwave truck is about 450 km/hr, the speed of a normal truck may be equal to
 (a) 500 km/hr (b) 600 km/hr (c) 120 km/hr (d) 450 km/hr
10. are used to stop a moving Shockwave truck, and that is the same technique used in designing
 (a) three engines – airplanes (b) four parachutes – bicycles
 (c) two parachutes – airplanes (d) three parachutes – rockets

11. A jet airplane is faster than a normal truck because the
 (a) jet airplane is heavier than a normal truck
 (b) jet airplane can fly while a normal truck can't
 (c) jet airplane has a more powerful engine than a normal truck
 (d) jet airplane is bigger than a normal truck
12. A cart fixed by three fire extinguishers will cover a longer distance than a car fixed by fire extinguishers.
 (a) four (b) two (c) five (d) six
13. By decreasing the number of fire extinguishers fixed onto a cart, the cart speed
 (a) doesn't change (b) stays the same
 (c) decreases (d) increases

2 Put (✓) or (X):

1. A normal truck can move faster than a jet airplane. (Suez – South 2024) ()
2.  Opening the desk drawer is a pulling force. ()
3. You can pull or push an object to make it move. ()
4. Any object can move or stop according to the change of forces acting on it. ()
5. The stopping object can't move until a force acts on it. (Alex. 2024) ()
6. Putting on your socks is a pull force, while taking them off is a push force. ()
7.  The engine of a jet plane is weaker than the engine of a car. ()
8. Parachutes help the Shockwave truck to increase its speed quickly. ()
9. To slow down the speed of a Shockwave truck, the driver uses three jet engines. ()
10. Wind can move some objects, such as tree leaves. ()

3 Correct the underlined words:

1. The engine of a jet airplane is less powerful than that of a normal truck. (.....)
2. Kicking the ball is a pulling force. (.....)
3. A Shockwave truck is fixed with three parachutes to increase its speed. (.....)

4 Complete the following sentences:

1. To slow down the speed of a Shockwave truck, the driver uses
parachutes. (Alex. 2023)
2. When the air is released backward from a fire extinguisher fixed to a cart, the
cart moves
3.  The body whose position does not change is in a state.
4.  The fastest truck in the world is the truck.
5. By increasing the number of fire extinguishers fixed to a cart, the cart's speed
will
6.  There are two types of forces which are and forces.
7.  causes the movement of static objects.
8.  Kicking the ball is a force.
9.  Opening the door handle is a force.
10.  The speeds of trucks differ according to their

5 Write the scientific term:

1. It is a force that you use to move an object away from you.
(Cairo 2023) (.....)
2. It is a force that you use to move an object towards you. (.....)
3. It is the fastest truck in the world that has three jet engines. (.....)
4. They are the tools used by a driver to slow down and stop the shockwave truck.
(.....)

6 What is meant by each of the following:

1. Pushing force?
.....
.....
2. Pulling force?
.....
.....

7 Variant questions:

1. Mention the types of forces.

.....

2. Give an example of both a pushing force and a pulling force.

.....

8 Study the following figures, then choose:

A



Figure (1)



Figure (2)



Figure (3)

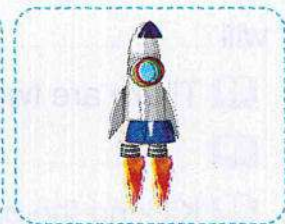


Figure (4)

1. The vehicle in figure (1) is that in figure (2).

(a) faster than

(b) slower than

2. The vehicles in figures (2) and (4) have to slow down their speed.

(a) parachutes

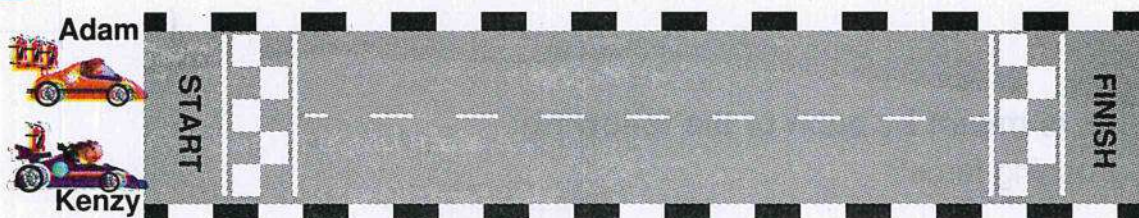
(b) engines

3. The vehicle in figure (2) has that are as powerful as those found in the vehicle in figure (3).

(a) three parachutes

(b) three engines

B



1. will reach the Finish line first.

(Kenzy – Adam)

2. Adam covers a distance than Kenzy.

(longer – shorter)

3. When the air is released backward from the fire extinguishers, the car moves

(backward – forward)

9 Study the following figures, then mention the type of force:

Figure				
Push or Pull Force	1	2	3	4

10 Give a reason for:

1. When you kick a ball with your foot, you are acting as a pushing force.

.....

2. The Shockwave truck is faster than the normal truck.

(Giza 2025)

.....

3. Parachutes are used by engineers in designing the Shockwave truck.

.....

4.  A cart starts moving when air comes out of the fire extinguishers.

.....

5.  The speed of a jet plane is greater than the speed of a truck.

.....

11 What happens if:

1.  You kick the ball with a certain force?

.....

2. You fix a jet engine to a normal truck?

.....

3. The driver of a moving Shockwave truck opens the parachutes?

.....

4. The air is released backward from a fire extinguisher fixed to a cart?

.....

5.  We increase the number of fire extinguishers fixed onto a cart?

.....

Lesson

2

Activity 4 What Do You Already Know About Starting and Stopping?

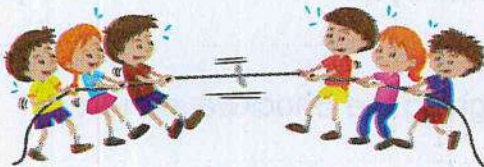
- Static objects require **pushing force** or **pulling force** to move them.

• تحتاج الأجسام الثابتة قوة دفع أو قوة سحب لتحريكها.

Balanced and Unbalanced Forces

- In the tug-of-war game, two teams **pull** the rope in the **opposite** directions.

Balanced Forces

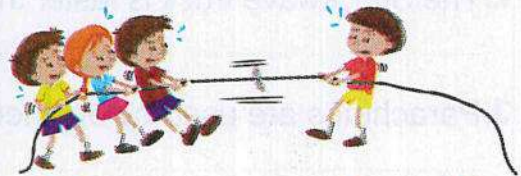


The rope doesn't move.

- When the forces acting on the rope are **balanced**.

الحبل لا يتحرك إذا أثرت عليه قوى متزنة.

Unbalanced Forces



The rope moves towards the greater force.

- When the forces acting on the rope are **unbalanced**.

إذا أثرت على الحبل قوى غير متزنة يتحرك في اتجاه القوة الكبرى.

- From the previous two cases, we can conclude that:

- If **unbalanced** forces act on an object, this object **will move** toward the greater force.
- If **balanced** forces act on an object, this object **will not move**.

• إذا كانت القوى المؤثرة على الجسم متزنة، فإن الجسم لن يتحرك.

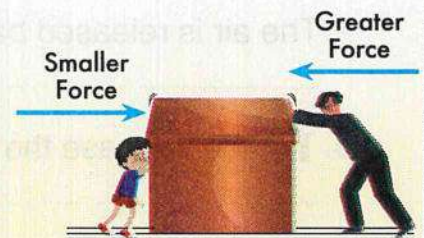
• إذا كانت القوى المؤثرة على الجسم غير متزنة، فسيتحرك هذا الجسم.



Check your understanding?

» Choose the correct answer:

- In the opposite figure, the box is under the effect of (**balanced – unbalanced**) forces, and the box moves to the (**right – left**).



Activity 5 Objects in Motion

» We can say that an object is in a state of motion when its **position** changes relative to a fixed point.

Motion

It is the change in an object's position relative to a fixed point.

الحركة: هي تغير موضع الجسم بالنسبة لنقطة ثابتة.

Example of the Motion of an Object:



- 1 The boy holds a ball and stands beside a tree (the starting point).
- 2 The boy throws the ball, so the **pushing** force of his hand moves the ball through the air.
- 3 The ball drops into the girl's hand by the **pulling** force of **gravity**.
- 4 The girl stops the ball when she catches it, using the **pushing** force in the opposite direction.

- 1 يقف الولد بجانب الشجرة (موضع البداية).
- 2 تتحرك الكرة في الهواء؛ بسبب قوة الدفع من الولد.
- 3 قوة الجاذبية تسببت في سقوط الكرة بيد البنت.
- 4 تلتقط البنت الكرة وتوقفها عن طريق قوة الدفع أيضاً، ولكن في اتجاه معاكس.

Gravity

It is the force that pulls the objects down towards the Earth.

قوة الجاذبية: هي القوة التي تسحب الأجسام لأسفل نحو الأرض.

Some motions are easy to be seen, such as:

A person walks down the street.

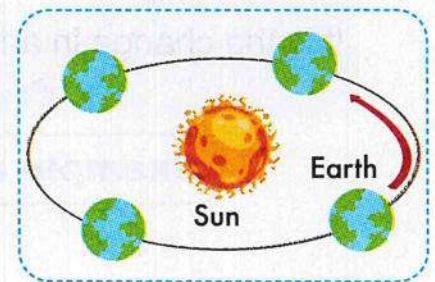


The movement of leaves by the blowing wind.



Some motions are hard to see, such as:

The revolution (movement) of Earth around the sun.



What two things must occur for a ball to be in motion?

- 1 A force must act on the ball to start moving.
- 2 The position of the ball must change.



Check your understanding?

» Complete the following sentences from the words between the brackets:

1. The forces cause the static object to move.
(balanced – unbalanced)
2. The gravity is a force.
(pushing – pulling)
3. When a body moves forward, its changes.
(position – shape)
4. Opening a closed drawer requires a force.
(pushing – pulling)
5. Moving an object away from you represents a force.
(pushing – pulling)
6. A ball thrown in the air falls down toward the ground by the effect of force.
(pushing – gravity)

Activity 6 Force

» Put (✓) or (X):

1. A force is needed to move an object and change its position. ()
2. When balanced forces act on an object, the object moves. ()

Force

It is a push or a pull applied to an object causes it to change its position.

- » The world around us is in constant motion.
- » All motion, fast or slow, is caused by **pulling** or **pushing** forces.

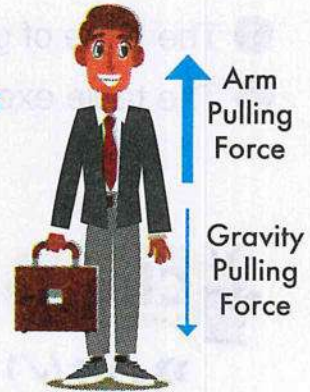
When two **unbalanced pulling forces** act on an object in **opposite** directions, the object will **move** toward the **greater force**.

Example:

- » When you lift a bag up, there are two **unbalanced forces** acting on the bag in opposite directions, which are:

- 1 The **pulling** force of your arm **upward**.
- 2 The **pulling** force of gravity **downward**.

So, the bag moves **upward** toward the greater force.



عندما ترفع حقيبتك، هناك قوى غير متزنة في اتجاهين مختلفين تؤثر على الحقيبة:
1 قوة ذراعك تجذب الحقيبة لأعلى. 2 قوة الجاذبية تجذب الحقيبة لأسفل.
وبالتالي تتحرك الحقيبة لأعلى باتجاه القوة الكبرى.

When two **balanced forces** act on an object in **opposite** directions, the object will **NOT** move.

Example 1:

When you are sitting on a chair, there is no motion. **G.R**

Because there are two **balanced forces** acting on you, which are:

- 1 The force of gravity **pulls** you downward.
- 2 The chair exerts a force to **push** you upward.



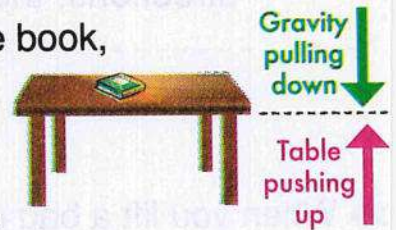
عندما تجلس على الكرسي، هناك قوى متزنة في اتجاهين مختلفين تؤثر عليك:
1 قوة الجاذبية تجذبك لأسفل. 2 قوة دفع الكرسي لك لأعلى.

Example 2:

A book placed on a table isn't in motion. **G.R**

Because there are two **balanced forces** acting on the book, which are:

- 1 The force of gravity **pulls** the book downward.
- 2 The table exerts a force to **push** the book upward.



عندما تضع كتاباً على المنضدة، هناك قوى متزنة في اتجاهين مختلفين تؤثر على الكتاب:
1 قوة الجاذبية تجذب الكتاب لأسفل. 2 قوة دفع المنضدة للكتاب لأعلى.



Check your understanding?

» Put (✓) or (X):

1. A ball placed on the ground is affected by unbalanced forces.

()

2. Unbalanced forces cause a change in the object's position.

()

Lesson Two

Answered

1 Choose the correct answer:

- Objects fall down toward the center of the Earth by the force of
 (a) friction (b) gravity
 (c) wind (d) pushing (Cairo, Giza, Alex. 2023)
- forces cause the movement of static objects.
 (a) Balanced (b) Friction (c) Unbalanced (d) Equal (Kafra El-Sheikh 2023)
- is a push or a pull that is applied on an object.
 (a) Motion (b) Force (c) Light energy (d) Speed
- When an object is in motion, this means that its changes.
 (a) color (b) shape
 (c) position (d) size (Cairo 2024 – Alex. 2025)
- When you sit on a chair, the force of gravity is and holding you on the chair.
 (a) pulling you downward (b) pulling you upward
 (c) pushing you downward (d) pushing you upward (Cairo 2022)
- In the opposite figure, the body is under the effect of forces and is moving to the
 (a) balanced – right
 (b) balanced – left
 (c) unbalanced – right
 (d) unbalanced – left (Dakahlia 2024)



- You can see the movement of all the following objects, except the movement of
 (a) a flying airplane (b) a running horse
 (c) sea waves (d) the planet Earth (Giza 2023)
- Gravity is a force that
 (a) pushes objects down toward the Earth
 (b) pulls objects down toward the Earth
 (c) pushes objects up toward the sky
 (d) pulls objects up toward the sky (Kafra El-Sheikh 2023)

9. Which situation doesn't describe an object in a state of motion?
 (a) A ball rolling on the ground. (b) A boy sitting on a chair.
 (c) A running dog. (d) A flying kite.
10. When two balanced forces act on a static object, the object will
 (a) move to the right (b) move to the left
 (c) move faster (d) stay static
11. All the following are examples of motion, except (Cairo 2024)
 (a) a running person (b) a flying bird
 (c) a sleeping dog (d) a ball travelling through the air
12. A ball thrown in the air is affected by the force of your hand and the force of gravity.
 (a) pulling - pushing (b) pulling - pulling
 (c) pushing - pulling (d) pushing - pushing
13. In the tug-of-war game, the two teams the rope in the direction(s).
 (a) push – same (b) pull – opposite
 (c) push – opposite (d) pull – same

2 Put (✓) or (X):

1. When the position of an object changes relative to a fixed point, it moves. (Assiut 2023) ()
2. A pulling force is used to operate an electrical switch. (Menofia 2024) ()
3. A stopping object can't move until a force acts on it. (Cairo 2023) ()
4. Gravity pulls objects upward. (Port Said 2023) ()
5. Gravity is the pulling force that pulls the objects downward. (Alex. 2023) ()
6. When a pen falls down from your hand, the force acting on it is the gravity force. (Dakahlia 2023) ()
7. Balanced forces cause a change in the object's position. (Red Sea 2024) ()
8. Unbalanced forces cause the motion of objects. (Dakahlia 2023) ()
9. In the tug-of-war game, if each team pulls the rope with equal forces, these forces the rope will not move. ()

10. In the tug-of-war, the rope moves toward the team that pulls with a smaller force. ()
11.  If balanced forces act on an object, it moves. ()
12. The seesaw moves up and down because the forces that act on it are unbalanced. ()
13. When two equal pushing forces act on an object in two opposite directions, it will move. ()
14.  The movement of planets can be seen in the sky. ()

3 Complete the following sentences:

1. The force that pulls things downward is known as (Azhar 2024)
2.  A moving object is affected by forces, while a body at rest is affected by forces.
3. In the tug-of-war game, when the acting forces on the rope are, the rope moves toward the force.
4.  An apple falling from a tree is caused by the force of, while kicking a ball is an example of a force.
5. Motion is the change in an object's relative to a point.
6.  An object moves when forces act on it.

4 Write the scientific term:

1. It is the force that pulls objects down toward the Earth. (Port Said 2025) (.....)
2. It is the change in an object's position relative to a fixed point. (Giza 2024) (.....)
3. It is a push or a pull that is applied on an object causing it to change its position. (Cairo 2022) (.....)
4. It is the force used to move the object toward you. (.....)
5. It is the force used to move the object away from you. (El Menoufia 2024) (.....)

5 Correct the underlined words:

1. Unbalanced forces cause a change in the object's motion. (Port Said 2023) (.....)

2. A ball placed on grass is affected by **unbalanced** forces. (.....)
3. The **balanced** forces cause the object to move. (Gharbia 2023) (.....)
4. The gravity is a **pushing** force. (.....)
5. To move a wheelbarrow, you need to **pull** it. (.....)

6 Classify the following figures into push or pull forces:



1



2



3



4

7 In the picture in front of you:

(Dakahlia 2025)

1. Are the forces on both sides balanced or unbalanced?

.....

2. In which direction will the rope move? (Right or left)

.....



8 Study the following figures, then choose the correct answer:

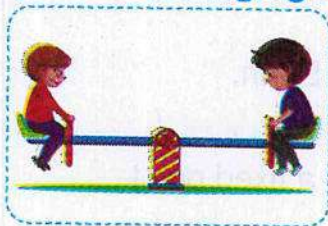


Figure (1)

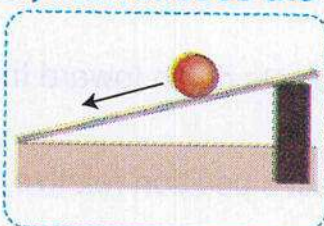


Figure (2)



Figure (3)

1. In figure (1), if one more child sits on the left side of the seesaw, the
 (a) left side will go up (b) right side will go up
 (c) seesaw will stay in the same position
2. The acting forces are balanced in
 (a) figure (1) only (b) figure (2) (c) both figures (1) and (3)
3. In figure (2), the marble will roll down the ramp because the forces acting on it are forces.
 (a) balanced (b) equal (c) unbalanced

9 Give a reason for:

1. When you let a ball out of your hand.
.....
2. A book placed on a table doesn't move.
.....
3. In the tug-of-war game, when the two teams pull the rope with equal forces, the rope doesn't move.
.....
4.  An object does not move when balanced forces act on it.
.....
5.  An object moves when unbalanced forces act on it.
.....

10 What happens if:

1. Balanced forces act on a static object? [Beni Suif 2023]
.....
2. The two teams in the tug-of-war game pull the rope with unequal forces in opposite directions?
.....

11 What's meant by each of the following:

1. Motion?
.....
2. Force?
.....
3. Gravity?
.....

12 Variant questions:

1. Give an example of an easily seen movement and another that cannot be seen.
.....
2. Give an example of an object that is affected by unbalanced forces.
.....
3. Mention an example of an object that has balanced forces acting on it.
.....

Lesson 3

Activity 7 Stopping Motion

» Study the figure, then complete the sentence using the words between brackets:

(same – greater – opposite – less)

- To stop the ball, the goalkeeper needs to act with a force in the direction on the ball.



Stopping Motion

» A moving object only stops when:

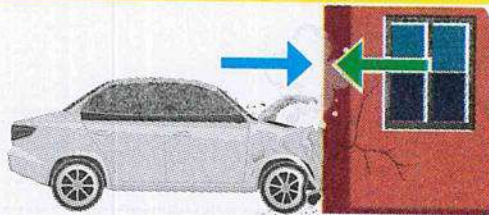
A force of the **same amount** is applied to it in the **opposite direction** of its motion.

• تتوقف الأجسام عن الحركة، عندما تكون القوى المؤثرة على الجسم متساوية في المقدار ومتضادة في الاتجاه.

The force that stops a moving object may be:

Easy to be observed, such as:

Collision (Crashing).



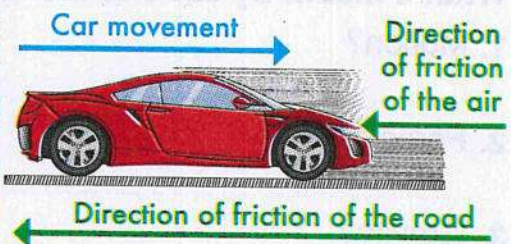
Car pushing force = Wall pushing force

- A car will stop moving when it crashes into a wall. **G.R**
Because the wall acts on the moving car with the **same** amount of force in the **opposite** direction of its motion.

• تتوقف السيارة عن الحركة عند اصطدامها بالجدار؛ حيث يؤثر الحائط على السيارة بقوة مساوية لقوة السيارة في اتجاه معاكس.

Hard to be observed, such as:

Friction.



- A car stops on a flat road after running out of fuel. **G.R**
Due to friction force which acts in the opposite direction of the car's movement.

• تتوقف السيارة على الطريق بعد نفاد الوقود؛ بسبب قوة الاحتكاك التي تؤثر في اتجاه معاكس لحركة السيارة.

Friction Force

- » Friction force always **slows down** or **stops** moving objects.
- » Friction force acts in the **opposite direction** of the motion of a moving object.

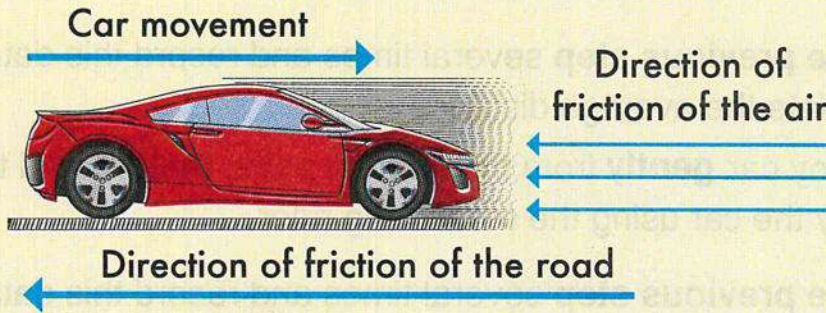
• تعمل قوة الاحتكاك على تبطيء الجسم أو إيقافه. • تؤثر قوة الاحتكاك في عكس اتجاه حركة الجسم.

Example:

- When the fuel inside the car runs out, the car's speed decreases gradually until it stops, due to:
 - 1 The friction between the car's tires and the road.
 - 2 The friction between the air flowing against the car's surface.

عندما ينفد وقود السيارة، تقل سرعتها حتى تتوقف، نتيجة لـ:

1 قوة الاحتكاك بين إطارات السيارة والطريق. 2 قوة احتكاك الهواء بسطح السيارة.



Friction

It is a force that is exerted when objects rub against each other.

هي القوة التي تُبذل بين سطحي جسمين متلامسين.



Check your understanding?

» Put (✓) or (X):

1. Friction force speeds up a moving object. ()
2. Friction forces arises between two surfaces in contact. ()

Activity 8 Rolling Cars

In this activity, you will explore the effect of applying **different** amounts of force to a static object.

Tools:

- 1 Toy car
- 2 Measuring ruler

Steps:



- 1 Push the toy car **hard** from the starting point, **then** record the distance covered by the car using the measuring ruler.
- 2 **Repeat the previous step** several times and record this data in a table, then calculate the average distance.
- 3 Push the toy car **gently** from the starting point, **then** record the distance covered by the car using the measuring ruler.
- 4 **Repeat the previous step** several times and record this data in a table, then calculate the average distance.

Results:

Table (A): When the toy car is pushed hard:

Trial	1	2	3	4
Distance	11	14	15	16

$$\text{Average distance} = \frac{11 + 14 + 15 + 16}{4} = \frac{56}{4} = 14 \text{ cm.}$$

Table (B): When the toy car is pushed gently:

Trial	1	2	3	4
Distance	8	10	12	14

$$\text{Average distance} = \frac{8 + 10 + 12 + 14}{4} = \frac{44}{4} = 11 \text{ cm.}$$

Observations:

- When we push the car gently, the car moves **slower** and covers a **shorter** distance.

• عند دفع السيارة برفق:
تتحرك السيارة ببطء، وتقطع مسافة أقصر.

- When we push the car hard, the car moves **faster** and covers a **longer** distance.

• عند دفع السيارة بقوة:
تتحرك السيارة بسرعة، وتقطع مسافة أطول.

Conclusions:

- By increasing the acting force on an object:

- It moves a longer distance.
- Its speed increases, and its kinetic energy increases.

• كلما زادت القوة المؤثرة على الجسم:
يتحرك الجسم مسافة أكبر - تزداد سرعة الجسم وطاقة حركته.

- By applying the same force on different objects:

- The **small car** moves a **long** distance.
- The **big truck** moves a **short** distance.

• عندما تؤثر نفس القوة على أجسام مختلفة:
السيارة تسير لمسافة كبيرة - الشاحنة تسير لمسافة صغيرة.



Lesson Three

Answered

1 Choose the correct answer:

1. A moving bicycle will when a force of the same amount is applied to it in the opposite direction of its motion.
 (a) move faster (b) stop
 (c) move with greater speed (d) move at the same speed
2. When a car crashes into a wall, it will
 (a) stay moving (b) move faster
 (c) cover a longer distance (d) stop
3. On throwing a ball up in the air, it will fall down due to the effect of force.
 (a) gravity (b) friction (c) magnetism (d) pushing
4. There is a force between the car tires and the road that acts to decrease the car's speed gradually. (Cairo 2023)
 (a) pushing (b) pulling (c) gravity (d) friction
5. The force that occurs when an object rubs against another object is called force. (Minia 2022)
 (a) friction (b) gravity (c) push (d) pull
6. The force that tries to stop an object moving on a surface is known as (Cairo 2024)
 (a) friction (b) gravity (c) pull (d) push
7. Friction force the speed of a moving object because it affects it in direction of the object's motion.
 (a) increases – the same (b) decreases – the same
 (c) decreases – an opposite (d) increases – an opposite
8. Which car covers the longest distance?
 (a) A small car pushed gently. (b) A big truck pushed hard.
 (c) A small car pushed hard. (d) A big truck pushed gently.
9. cause(s) an object to move, while cause(s) a moving object to stop.
 (a) Friction force – balanced forces (b) Balanced forces – friction force
 (c) Unbalanced forces – friction force (d) Unbalanced forces – gravity

10. When you push a toy car and a toy truck with the same force,

- (a) they will cover the same distance
- (b) the toy car will move slower
- (c) the toy truck will move faster
- (d) the toy car will cover a longer distance

11. When acting with the same force on different toys, the toy whose mass is covers the shortest distance.

- (a) 200 grams
- (b) 100 grams
- (c) 70 grams
- (d) 250 grams

2 Put (✓) or (X):

1. A book placed on a table is affected by the pulling force of gravity. ()
2. When a car crashes into a wall, it will not stop. (Alex. 2023) ()
3. When a car runs out of fuel on a flat road, its speed increases gradually until it stops. (Sharkia 2023) ()
4. Friction force slows down or stops the motion of moving objects. (Red Sea 2024) ()
5. Friction force arises between the surfaces of two contacted bodies. (Qalyobia 2024) ()
6. Friction is a force that opposes the motion direction. (Dakahlia 2024) ()
7. Friction force acts in the same direction of the motion of objects. (Dakahlia 2023) ()
8. If a car runs out of fuel, its speed decreases gradually. ()
9.  An object moves a greater distance if a greater pushing force is exerted on it. ()
10. The moving body stops when the same amount of force is applied to it in the same direction of its motion. ()
11. A moving bike will stop when the boy stops pedaling as a result of the friction force. ()
12. A big truck covers a longer distance than a small car if they are pushed with the same amount of force. ()
13. On rolling a ball on the floor with hard force, it will move a longer distance then it stops due to the force of gravity. ()

3 Complete the following sentences using the words between the brackets:

(hard – bigger – the same – short – decreases – opposes – long)

1. If you push two different objects with the same amount of force, the object will move a shorter distance.
2. If you pulled two similar chairs with the same force, they will travel distance.
3. Air the motion of a car.
4. When a boy kicks a ball, it will cover a distance.
5. When you pull a box gently, it will cover a distance.
6.  When a force acts against the direction of motion of an object, its speed

4 Write the scientific term:

1. It is the force exerted when objects rub against each other.
(Azhar 2023) (.....)
2. It is the force that slows down and opposes the motion of a moving object.
(Alex. 2024) (.....)
3.  It is a force that arises between the surfaces of two objects in contact.
(.....)

5 Correct the underlined words:

1. A toy car moves a long distance when it is pushed gently. (.....)
2. Gravity is the force that arises between the surfaces of two contacted bodies.
(Azhar – Cairo 2024) (.....)
3. Friction force increases the speed of a moving object. (.....)

6 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Gravity	Ⓐ causes an object to move for a longer distance.
2. Friction force	Ⓑ causes an object to move for a shorter distance.
3. A hard force	Ⓒ is a force that pulls objects down toward the Earth.
4. A gentle force	Ⓓ slows down the object's motion.

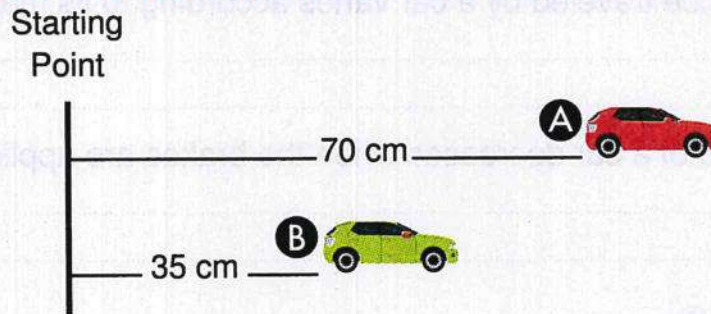
1. 2. 3. 4.

7 **What's meant by:**

(Cairo 2025)

- Friction?

8 **Look at the following figure, then answer the question below:**



- Which of these toy cars is affected by a greater force?
(Give a reason for your answer.)

(Cairo 2022)

9 **When pushing a ping-pong ball and a basketball on the floor with the same amount of force, read the following statements, then put (✓) or (X):**



1. The basketball will move faster than the tennis ball. ()
2. The tennis ball will move a longer distance. ()
3. When we increase the pushing force, the two balls will move faster. ()
4. The friction force decreases the speed of both balls gradually before they stop. ()
5. The two balls are affected by the friction force and the pushing force of gravity. ()

10 **Give a reason for:**

1. A moving car stops when it crashes into a wall.

.....
.....

2. When a ball is pushed on the ground, it moves a distance and then stops.

(Cairo 2025)

.....
.....

3. When pushing two toys of different sizes on the floor, the smaller toy will cover a longer distance.

4.  The distance traveled by a car varies according to its mass.

5.  The speed of a car decreases when the brakes are applied.

11 What happens if:

1. A moving car runs out of fuel?

2. A boy on a bike stops pedaling?

(Kafr El-Sheikh 2023)

3. You push a toy car gently on the ground?

4. You hit a ball strongly with your foot?

(Alex. 2024)

5. A driver presses the brakes of the car?

12 Explain the difference in the distance traveled by two cars of different masses.

Lesson

4

Activity 9 Energy, Work, and Force

» To push a car along a flat road, this needs a lot of **force**.

» When you push the car, **energy** transfers from your body to the car.

» When the car moves, this means that you are doing **work**.



- لكي تدفع سيارة على طريق مستوي، يتطلب تحريك السيارة قدرًا كبيرًا من القوة.
- عندما تدفع السيارة، تنتقل الطاقة من جسمك إلى السيارة.
- عندما تتحرك السيارة، فأنت تقوم بشغل.

The relationship between energy, work, and force:



- Force and energy are different, but they are **related** to each other.
- **Force** transfers **energy** from one object to another.
- **Force** is something that changes **energy** so that it can do **work**.

- القوة والطاقة مختلفتان، لكنهما مرتبطتان ببعضهما.
- القوة تنقل الطاقة من جسم إلى آخر.
- القوة هي المؤثر الذي يغير الطاقة لتتمكن من بذل الشغل.

NOTES:

- Energy is the ability to do work.
- The work done is the amount of energy transferred by a force to move an object.

Check your understanding?

» Put (✓) or (X):

1. A force can transfer energy from one object to another. ()
2. When you apply force on an object and it doesn't move, that means no work is done. ()

Activity 10 Record Evidence Like a Scientist:

» Now that you have learned about the role of balanced and unbalanced forces in starting and stopping, **review** Truck Versus Airplane again. You first saw this in Wonder.



Question:

» How do forces act on different objects to make them start moving or stop moving?



My Claim:



Evidence:



Scientific Explanation with Reasoning:

Lesson Four

Answered

1 Choose the correct answer:

- The goalkeeper can stop the ball by applying force against the ball.
 (a) pulling (b) pushing (c) magnetism (d) gravity
- When a force causes an object to move through a distance, that means that is done.
 (a) energy (b) speed (c) work (d) mass
- is needed to do work.
 (a) Energy (b) Mass (c) Friction (d) Light
- If a boy tried to move a box and it didn't move, that means
 (a) work is done
 (b) no energy is consumed
 (c) energy is transferred from the box to the boy's body
 (d) no work is done
- If you pull a chair to sit on it,
 (a) you didn't do work
 (b) energy is transferred from your body to the chair
 (c) energy is transferred from the chair to your body
 (d) this force didn't require energy
- Work is done while
 (a) sitting on a chair (b) sleeping
 (c) pushing a wall (d) kicking a ball
- To move a static object, this requires a proper to act on it.
 (a) force (b) work (c) energy (d) speed

2 Put (✓) or (X):

- You are doing work while sitting on a chair. ()
- Energy is required to do work. ()
-  If a person moves a table through a distance, there's a work done. (Ghrabia 2024) ()
- When work is done, there is a transfer of energy. ()
- Lifting up a heavy box requires less energy than lifting up a smaller box. ()
- Hitting a tennis ball needs a pulling force. (Giza 2023) ()
- We need to apply force to do work. ()

3 Complete the following sentences using the words between the brackets:
(gravity – force – energy – work)

1. Energy is transferred from an object to another by
2. Work done is equal to the amount of transferred by the force to move an object.
3. When you push a motorbike and it starts to move, you are doing
4.  An apple falling from the tree is caused by the force of

4 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Friction	Ⓐ is the ability to do work.
2. Motion	Ⓑ is the force that pulls things down toward the Earth.
3. Energy	Ⓒ is the change in the position of an object.
4. Gravity	Ⓓ is a force that arises between the surfaces of two contacted bodies.

1. 2. 3. 4.

5 Look at the opposite figures, then answer the questions below:

1. Which ball needs more work for you to lift it up for 50 cm.



2. Complete:

If you want to push the bowling ball for a long distance, you need to apply a

(small – great) force that requires (less – more) energy.



6 Give a reason for:

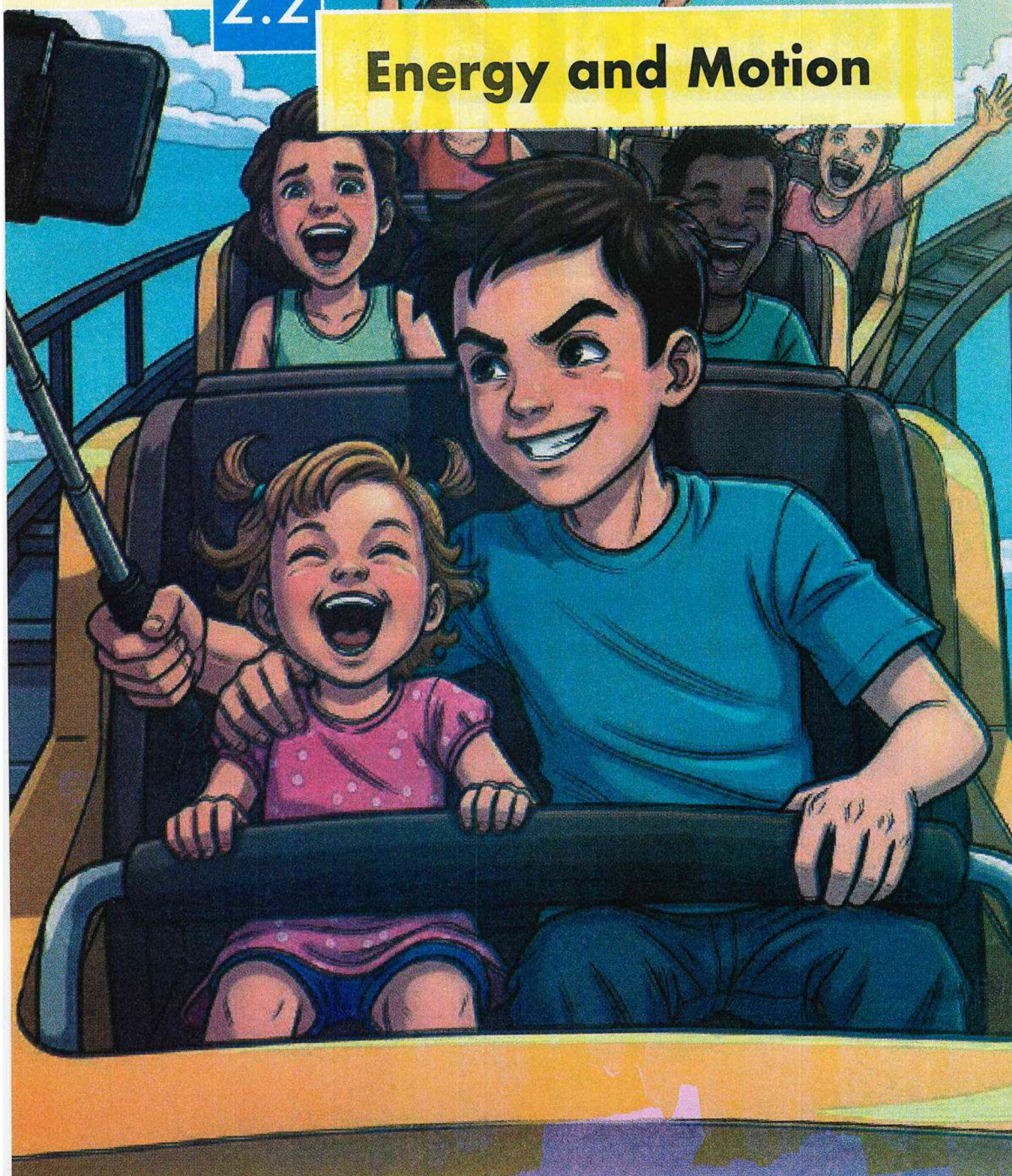
- Applying a force is needed to do work.

.....
.....

Concept

2.2

Energy and Motion



Concept 2

Energy and Motion

Lesson 1

- | | |
|------------|---|
| Activity 1 | Can You Explain? |
| Activity 2 | Roller Coaster |
| Activity 3 | What Do You Already Know About Energy and Motion? |

Lesson 2

- | | |
|------------|------------------------------|
| Activity 4 | Energy Basics |
| Activity 5 | Kinetic and Potential Energy |

Lesson 3

- | | |
|------------|---------------------------------------|
| Activity 6 | Forms of Kinetic and Potential Energy |
| Activity 7 | Types of Energy |

Lesson 4

- | | |
|------------|----------------------------------|
| Activity 8 | Easy Life Tool |
| Activity 9 | Record Evidence Like a Scientist |

Glossary

Lesson (1)

Activity (1)

Kinetic energy	طاقة الحركة	Potential energy	طاقة الوضع	Height	الارتفاع
Store	يخزن				

Activity (2)

Roller coaster	قطار الملاهي السريع	Motor	موتور	Hill	تل - منحدر
Converted into	تتحول إلى	Upward	لأعلى	Downward	لأسفل

Activity (3)

Chemical energy	الطاقة الكيميائية	Thermal energy	الطاقة الحرارية	Electrical energy	الطاقة الكهربائية
Light energy	الطاقة الضوئية	Electric devices	أجهزة كهربائية	Net	شبكة

Lesson (2)

Activity (4)

Basics	أساسيات	Exert	يبذل	Energy	طاقة
Work	شغل	Ability	القدرة	Distance	مسافة

Activity (5)

Position	موضع	Motion	حركة	Raise	يرفع
Leave	يترك	Tower	برج	Gain	يكتسب

Lesson (3)

Activity (6)

Sound waves	موجات الصوت	Light waves	موجات الضوء	Wires	أسلاك
Water particles	جزيئات الماء	Mass	كتلة	Compressed spring	زنبرك مضغوط

Activity (7)

Flashlight / Torch	كشاف الضوء	Gas oven	فرن الغاز	Toy car	سيارة لعبة
Electric lamp	مصباح كهربائي	Washing machine	غسالة	Fan	مروحة
Radio	جهاز راديو	Bell	جرس		

Lesson (4)

Activity (8)

Robot	إنسان آلي	Invent	يبتكر - يبتكر	Cap	غطاء
Function	وظيفة	Create	يخلق	Destroy	يدمر

Lesson

1

Activity 1 Can You Explain?

In this concept, we will study two kinds of energy that affect objects, whether they are **static** or **moving**.

First: Static objects:

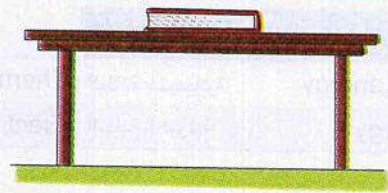
On the ground



The static ball on the ground has **no energy**.

الكرة الساكنة على الأرض ليس لديها طاقة.

At certain height



The static book on the table stores a kind of energy called **potential energy**.

الكتاب على المنضدة يخزن بداخله طاقة تُسمى طاقة الوضع.

Second: Moving objects:

- » The moving ball in the air gets a kind of energy called **kinetic energy** when a player kicks it.
- » When a force is applied to a static object, it starts to move and gain **kinetic energy**.



- الكرة المتحركة في الهواء اكتسبت نوعاً من الطاقة يُسمى طاقة الحركة عندما قام اللاعب بركل الكرة.
- عندما تؤثر قوة على ساكن، فإن الجسم يبدأ بالحركة ويكتسب طاقة حركية.



NOTES:

- All moving objects have type of energy known as kinetic energy.
- A sand surfer on the top of the hill has no kinetic energy, but he stores **potential energy**.
- When the sand surfer moves downhill, the stored **potential energy** changes into **kinetic energy**.



Activity 2 Roller Coasters

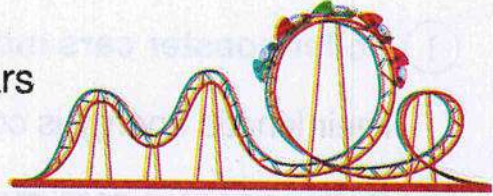
- » We have studied that, objects need energy to move.
- » In this activity, we will study the motion of the roller coaster.

Roller Coaster

At the beginning:

- **Electricity** and **electric motors** carry the cars of roller coaster up to the top of the hill.

تعمل الكهرباء والمحركات على حمل عربات القطار لأعلى التل.



1 During moving upward

- The stored potential energy **increases** gradually, while its speed decreases.

أثناء الصعود لأعلى، تزداد طاقة الوضع المخزنة داخل القطار تدريجياً.



2 At the highest point (At the top of the hill)

- The roller coaster stops briefly at the top of the hill, where the stored potential energy reaches its **maximum**.

يتوقف القطار لبرهة على قمة التل؛ حيث تصبح طاقة الوضع المخزنة أكبر ما يمكن.



3 During sliding down

- The stored **potential energy** is converted gradually into a more active energy called **kinetic energy**.
- As the roller coaster move down, its speed **increases** and kinetic energy **increases**.

• أثناء الانزلاق لأسفل، تتحول الطاقة المخزنة لطاقة حركية تدريجياً.
كلما اقتربت عربات قطار الملاهي من الأرض، تزداد سرعة الجسم وطاقة حركته.



Give a reason for:

- **Roller coaster cars don't need electricity when sliding down.**

- Because the stored potential energy is converted into kinetic energy.

What happens when:

① **Roller coaster cars move up the hill (according to energy change)?**

- Their kinetic energy is converted into potential energy.

② **Roller coaster cars move downhill (according to energy change)?**

- The stored potential energy is converted into kinetic energy.

③ **Roller coaster cars stop on the top of hill (according to their energy)?**

- The kinetic energy becomes zero.
- The stored potential energy reaches its maximum.

As the height increases
(while moving up)



potential energy
increases.

,

kinetic energy and
speed decrease.

As the speed increases
(while moving down)



kinetic energy
increases.

,

potential energy
decreases.



Check your understanding?

» Put (✓) or (X):

1. When the roller coaster slides down, its kinetic energy decreases. ()
2. Electric motors help the cars of a roller coaster to move up to the top of a ramp. ()

Activity 3 What Do You Already Know About Energy and Motion?

- » Energy is part of everything that happens in the world.
- » We need energy to grow, move, and do all our daily activities.

The Importance of Energy in Our Lives

- 1 Our bodies get the energy we need from the food we eat to help us move and grow.

• تحصل أجسامنا على الطاقة اللازمة من الطعام؛ لتساعدنا على التحرك والنمو.



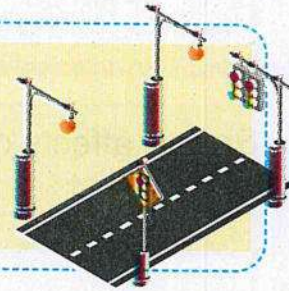
- 2 **Thermal energy** helps us in cooking food.

• الطاقة الحرارية تساعدنا في طهي الطعام.



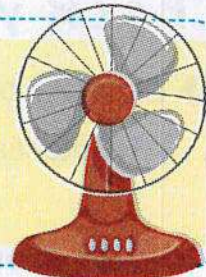
- 3 **Light energy** helps us light houses and streets.

• الطاقة الضوئية تساعدنا في إنارة المنازل والشوارع.



- 4 **Electrical energy** helps us operate all electric devices.

• الطاقة الكهربائية تساعدنا على تشغيل الأجهزة الكهربائية.



Moving Energy

» Energy can transfer from one object to another.

Example: When a football player kicks the ball:

1

The ball on the ground has **no** energy.

الكرة على الأرض ليس لديها طاقة.



2

When the player kicks the ball, kinetic energy is transferred from the **player's foot** to the **ball**, so the ball moves in the air.

عند ركل اللاعب للكرة، تنتقل طاقة الحركة من قدم اللاعب إلى الكرة؛ فتتحرك الكرة في الهواء.



3

The kinetic energy is transferred from the **ball** to the **goal net**, which vibrates.

تنتقل طاقة الحركة من الكرة للشباك التي تهتز.



Energy affects objects and makes them move or change their places.

الطاقة هي ما يؤثر في الأجسام المختلفة ويجعلها تتحرك أو تُغيّر من موضعها.



Check your understanding?

» Put (✓) or (X):

1. Potential energy is transferred from your foot to the ball when you kick it. ()

2. Food provides our body with energy needed to grow and move. ()

Lesson One

Answered

1 Choose the correct answer:

1. The energy gained by a ball when it falls from above is energy.

- (a) potential (b) kinetic (c) light (d) chemical

(Dakahlia 2022)

2. When an object moves down a ramp, its stored potential energy

- (a) increases (b) doesn't change
(c) changes to a less active form of energy
(d) changes to a more active form of energy

(Alex 2023)

3. Which of the following has no kinetic energy?

- (a) A running horse. (b) A rock on the ground.
(c) A sliding sand surfer. (d) A book falling from a table.

4. The roller coaster cars do not need electricity, while

- (a) moving up (b) sliding down
(c) starting motion (d) moving up and down

(Qalyobia 2024)

5. When the roller coaster stops, its energy of motion

(Sharkia 2024)

- (a) becomes zero (b) increases (c) decreases (d) doesn't change

6. As a roller coaster goes downhill, energy is converted into energy.

- (a) kinetic - potential (b) potential - kinetic
(c) electrical - potential (d) potential - electrical

7. When a car moves up a ramp, this happens due to the effect of

(Bent-Suef 2024)

- (a) gravity force (b) kinetic energy (c) sound energy (d) balanced force

8. A roller coaster moves down a hill because the

- (a) gravity pushes it downward
(b) kinetic energy changes into potential energy
(c) stored potential energy changes into kinetic energy
(d) balanced forces acting on it

9. The of the roller coaster increases during moving up on a hill.
 Ⓐ speed Ⓑ kinetic energy Ⓒ potential energy Ⓓ velocity
10. When a roller coaster moves down a hill, its kinetic energy
 Ⓐ decreases Ⓑ increases
 Ⓒ doesn't change Ⓓ becomes zero
11. All the following occurs when a roller coaster moves down a hill, except that
 Ⓐ gravity pulls it down
 Ⓑ its speed increases
 Ⓒ its potential energy increases
 Ⓓ it is affected by unbalanced forces
12. When a moving ball hits the goal net, it vibrates because the energy of the ball is transferred to it.
 Ⓐ sound Ⓑ light Ⓒ thermal Ⓓ kinetic

2 Put (✓) or (X):

1. When a moving object stops, its energy of motion becomes zero. ()
2. A wheelchair moving down a ramp has no kinetic energy. ()
3. When the roller coaster slides down, its kinetic energy increases. (Alex. 2023) ()
4. The speed of a roller coaster increases as it moves down the ramp. ()
5. A roller coaster doesn't need electricity when moving down a ramp. ()
6. A ball at the top of the hill has potential energy. (Cairo 2025) ()
7. The moving objects have energy, while the objects that don't move have no energy. (Giza 2022) ()
8. Potential energy is the energy of a moving body. (Giza 2024) ()
9.  When a roller coaster reaches the top, it stores kinetic energy. ()
10.  The kinetic energy of objects increases as their speed increases. ()
11.  Kinetic energy is transferred when a moving car collides with another at rest. ()

3 Correct the underlined words:

1. The faster an object moves, the less kinetic energy it has. (.....)
2.  Kinetic energy is the energy stored inside the body.
(Alex. 2025) (.....)
3. Any moving object has a form of energy known as light energy.
(Qalyubia 2023) (.....)
4. As the speed of a moving object increases, its potential energy increases.
(.....)
5.  A person at the top of a tower has the most kinetic energy. (.....)
6.  Potential energy is transferred from your foot to the ball when you kick it.
(.....)

4 Write the scientific term:

1. It is the form of energy that increases when the object's speed increases.
(Sohag 2022) (.....)
2.  It is the energy stored inside objects. (.....)
3. It is the kind of energy used to operate the motor of the roller coaster.
(.....)

5 Complete the following sentences:

1. The roller coaster gets energy from the found in its first car to start moving.
2. To move, we need that we obtain from
3.  An object at the top of a hill has no energy.
4.  energy increases as the speed of the object increases.
5.  The speed of a roller coaster increases as it moves toward the of the ramp.
6.  The energy used to carry a roller coaster up is
7.  When a skateboarder reaches the top of a hill and stops, his kinetic energy is
8.  When you push a small box with your foot, energy is transferred from to

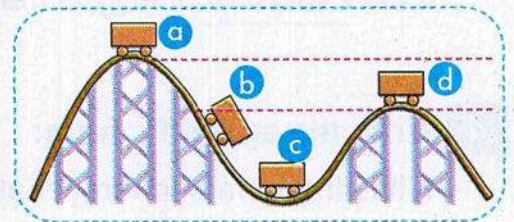
6 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Potential energy	Ⓐ is the energy gained during an objects' movement.
2. Kinetic energy	Ⓑ is the energy stored in a ball placed on the ground.
3. Balanced forces	Ⓒ is stored in an apple hanging from a tree.
	Ⓓ cause a static object to stay at rest.

1. 2. 3.

7 Look at the following figure, then complete:

- The roller coaster has the highest kinetic energy at point (.....).
- The roller coaster has the highest potential energy at point (.....).
- When the roller coaster moves from point (c) to point (d), its speed, while its potential energy
- The energy of the roller coaster becomes zero at point (.....) and point (.....).



8 Give a reason for:

- The kinetic energy of a roller coaster increases when it moves down a ramp.
.....
.....
- On moving down a ramp, a roller coaster doesn't need any electricity.
.....
.....
- The roller coaster stores more potential energy as it moves up toward the top of the ramp.
.....
.....

9 What happens if:

1. An object is placed at a height from the Earth's surface?
(According to its potential energy)
.....
2. The roller coaster moves down a hill? (According to the change in energy)
.....
3. The roller coaster moves down a hill? (According to its speed)
.....
4. A moving ball hits the goal's net?
.....

10 Look at the following figures, then choose the correct answer:



Figure (1)



Figure (2)



Figure (3)

1. In figure (1), when the boy moves down the dune,
☐ (a) his speed decreases ☐ (b) his kinetic energy increases
☐ (c) his potential energy increases
2. The rock on the cliff in figure (2) stores
☐ (a) potential energy ☐ (b) kinetic energy ☐ (c) no energy
3. When you throw the bowling ball toward pins in figure (3),
☐ (a) kinetic energy transfers from your hand to the ball
☐ (b) kinetic energy transfers from the ball to your hand
☐ (c) potential energy transfers from your hand to the ball
4. The pins in figure (3), will fall or vibrate when the ball hits them because
☐ (a) kinetic energy transfers from pins to the ball
☐ (b) kinetic energy transfers from the ball to pins
☐ (c) pins are affected by balanced forces

Lesson

2

Activity 4 Energy Basics

» Put (✓) or (X):

1. We eat food to obtain energy. ()
2. A roller coaster doesn't need electricity while moving downhill. ()

Basics of Energy

- ① Energy can be **stored** and **changed** from one form to another.

Example:

- At the top of a hill, the roller coaster **stores** potential energy.
- As the roller coaster moves down a hill, the stored potential energy is **changed** into kinetic energy.



- ② Most forms of energy can't be seen, such as:

- Thermal energy • Sound energy • Chemical energy • Electrical energy



- The form of energy that can be seen is **light energy**.

- ③ We can see and measure what energy can do.

Example:

- The goal net vibrates when a moving ball hits it, because kinetic energy transfers from the ball to it.



The Relationship between Energy, Force, and Work

» Force is the effect that changes energy to make it able to do work.

Energy

It is the ability to do work or cause a change.

Work

It is the force that causes an object to move a distance.

• القوة: هي المؤثر الذي يُغيّر الطاقة لتمكين من بذل شغل.

• الشغل: هو القوة التي تؤثر على الجسم؛ ليتحرك مسافة معينة.

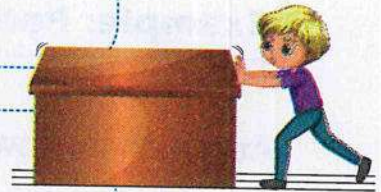
• الطاقة: هي القدرة على بذل شغل أو إحداث تغيير.

Example: When the boy pushes the box,

1 the pushing force causes the box to move.

2 the boy does **work** and he consumes **energy** to move his arm to push the box.

3 - the **work done** by the boy causes the box to move.
- the distance that the box moved can be measured.



① عندما يقوم الولد بدفع الصندوق، تُحرك قوة الدفع الصندوق.

② يبذل الولد شغلاً ويستهلك طاقة لتحريك ذراعه ليدفع الصندوق.

③ الشغل المبذول بواسطة الولد يسبب حركة الصندوق.

- يمكن قياس مقدار المسافة التي تحركها الصندوق.

Check your understanding?

» Put (✓) or (X):

1. Work occurs when a force causes an object to move.

()

2. Energy can't be changed from one form to another.

()

Activity 5 Kinetic and Potential Energy

Scientists Classify Energy Into Two Types:



Potential Energy

- It is the energy stored in an object due to its **position**.

• هي الطاقة المخزنة داخل الجسم بسبب موضعه.

When you raise the ball from the ground, it stores potential energy.

Example:

Kinetic Energy

- It is the energy that an object has due to its **motion**.

• هي الطاقة التي يمتلكها الجسم بسبب حركته.

When you leave the ball to fall, it gains kinetic energy.

Example: Potential energy changes to kinetic energy:

Adam on the tower has high potential energy.

آدم فوق البرج لديه طاقة وضع كبيرة.



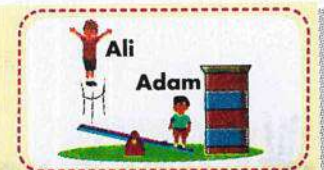
When **Adam** jumps down, his potential energy is converted into kinetic energy.

عندما يقفز آدم لأسفل، تتحول طاقة الوضع إلى طاقة حركية.



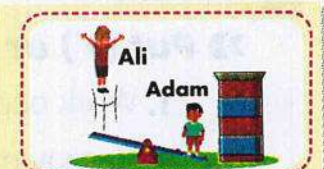
Kinetic energy is transferred to **Ali**, which pushes him up in the air.

تنتقل الطاقة الحركية من آدم إلى علي؛ لتدفعه لأعلى في الهواء.



During **Ali's** movement in the air, kinetic energy is converted gradually into potential energy.

أثناء ارتفاع علي لأعلى تتحول طاقة الحركة إلى طاقة وضع تدريجيًا.



Lesson Two

Answered

1 Choose the correct answer:

1. The force that causes an object to move a distance is called
 (a) work (b) potential (c) gravity (d) balanced force
2. The energy stored in an object due to its position is known as
 energy. [Alex. 2022]
 (a) kinetic (b) electrical (c) chemical (d) potential
3. Kinetic energy is the energy gained by an object due to its
 (a) position (b) shape (c) motion (d) size
4. The energy that is gained by an object due to its motion is known as
 energy.
 (a) thermal (b) potential (c) sound (d) kinetic [Cairo 2024]
5. When you transfer a dish to a higher shelf of a cupboard, its potential energy

 (a) increases (b) decreases
 (c) doesn't change (d) becomes zero
6. The form of energy that is stored in a book placed on a table is known as
 energy. [Suez 2024]
 (a) thermal (b) potential (c) light (d) sound
7. is the effect that changes to make it able to do work.
 (a) Energy – force (b) Energy – work
 (c) Force – energy (d) Work – force
8. When you leave a ball fall from your hand, its increases.
 (a) potential energy (b) height
 (c) size (d) speed
9. The form of energy that can be seen is the energy.
 (a) thermal (b) light (c) electrical (d) sound [Damietta 2024]

2 Put (✓) or (X):

1. When an object is moving horizontally, its potential energy doesn't change. ()
2. All energies can be classified into potential and kinetic energies. ()
3. We can see all kinds of energy, such as light energy. ()

4. Potential energy is a form of stored energy. (Damanhur 2023) ()
5. Any moving object has a form of energy known as kinetic energy. (Alex. 2023) ()
6. In a roller coaster, kinetic energy is converted into potential energy and vice versa. ()
7. Energy is the ability to do work. (Oalyubia 2023) ()
8.  A ball at rest on the ground has kinetic energy. ()
9. Kinetic energy is the energy that an object gains due to its motion. ()
10. When you apply a pushing force to an object causing its movement, this means work is done. ()

3 Correct the underlined words:

1. When an object has kinetic energy, it is ready to be more active. ()
2. As an object moves faster, its potential energy increases. ()
3. The ability to do work or make a change is known as power. ()
4. Work is a push or pull that causes an object to move. ()

4 Write the scientific term:

1. It is a force that causes an object to move a distance. ()
2. It is the ability to do work or cause a change. (Ismailia 2022 / Giza 2024 / Cairo 2025) ()
3. It is the energy stored in an object due to its position at a certain height from Earth's surface. (Luxor 2023 / Cairo 2022) ()
4. It is the energy that the object gains due to its motion. (Luxor 2023 / Minia 2022) ()

5 Complete the following using the words between the brackets:

(light – increases – potential – decreases - kinetic)

1. The energy is a stored energy or the energy of position. (Alex. 2023)
2. The energy possessed by an object due to its motion is known as energy.

3. The form of energy that can be seen is energy. (Qalyubia 2023)
4. If you throw a ball upward, its kinetic energy while its potential energy

6 Cross out the odd word:

- Thermal energy – Chemical energy – Sound energy – Light energy (Qalyubia 2023)
- (.....)

7 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. A basketball is thrown upward	(a) has neither kinetic energy nor potential energy.
2. A cat standing on a tree	(b) has no kinetic energy.
3. An apple is falling from a tree	(c) its potential energy will decrease.
4. A book placed on the ground	(d) its potential energy will increase.

1. 2. 3. 4.

8 Look at the following figure, then choose the correct answer:

1. The swimmer standing on the diving board, has

- (a) the most kinetic energy
- (b) the least potential energy
- (c) the most potential energy

2. When the swimmer jumps, his potential energy while his kinetic energy

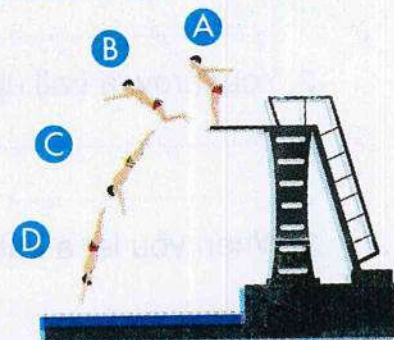
- (a) increases – decreases
- (b) decreases – increases
- (c) decreases – decreases

3. At which point the swimmer has the most kinetic energy?

- (a) Point (A).
- (b) Point (B).
- (c) Point (C).
- (d) Point (D).

4. Water in the swimming pool moves when the swimmer jumps in it, because energy transfers from his body to it.

- (a) kinetic
- (b) potential
- (c) sound



9 Give a reason for:

1. A book on the table has energy.

.....

.....

2. A bird flying up in the sky, its potential energy increases.

.....

.....

3. When an apple falls from a tree, its kinetic energy increases.

.....

.....

4. A car moving on the road has energy.

.....

.....

11 What happens if:

1. You transfer a book to a lower shelf?

(According to its potential energy)

.....

.....

2. You throw a ball upwards?

(According to its potential energy)

.....

.....

3. When you let a ball falls down from your hand?

(According to the change in its energy)

.....

.....

Activity 6 Forms of Kinetic and Potential Energy

- » All forms of energy can be classified into **potential** or **kinetic** energies.
- » In this lesson, we will study some forms of kinetic and potential energies.

• في هذا الدرس، سوف نقوم بدراسة صور طاقتي الحركة والوضع.

• كل صور الطاقة يمكن تصنيفها إلى طاقة وضع أو طاقة حركة.

1 Forms of Kinetic Energy:

1 Sound energy

The movement of sound waves in the air.



انتقال موجات الصوت في الهواء.

2 Light energy

The movement of light waves in the air.



انتقال موجات الضوء في الهواء.

3 Electrical energy

The movement of electricity through wires.



الكهرباء تسري خلال الأسلاك.

4 Thermal energy

The vibration of water particles during heating.



اهتزاز جزيئات المياه عند تسخينها.

2

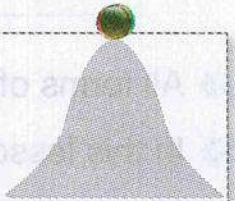
Forms of Potential Energy:

1 Gravitational potential energy

- When an object is raised up against the Earth's gravitational force "gravity", this object stores gravitational potential energy.

Example: A ball at the top of a hill stores **gravitational potential energy**.

• الكرة أعلى التل تخزن بداخلها طاقة وضع الجاذبية.



2 Chemical potential energy

- A battery stores **chemical potential energy**.
- The chemical energy stored in a battery isn't used until the battery is connected to any device.

• البطارية تخزن بداخلها طاقة وضع كيميائية.

• لا تُستخدم الطاقة الكيميائية المُخزنة داخل البطارية إلا عند توصيل البطارية بأحد الأجهزة.



NOTE:

- A compressed spring stores **potential energy** in it.

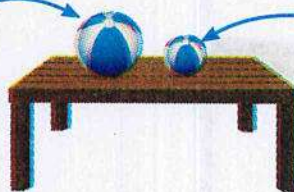
• الزنبرك المضغوط يخزن بداخله طاقة وضع.



Factors Affecting the Potential Energy of an Object

1 The object's mass:

The ball with the bigger mass has a greater potential energy.

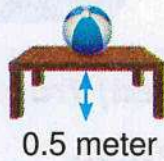
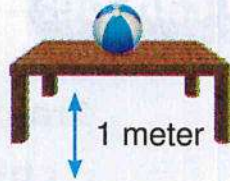


The ball with the smaller mass has less potential energy.

As an object's mass increases, → its potential energy increases.

2 The object's height from the Earth's surface:

The ball in a higher position has a greater potential energy.



The ball in a lower position has less potential energy.

As the object's height from the ground increases,



its potential energy increases.

Change of Potential Energy into Kinetic Energy:

Example: A boy moving down on a playground slide:

- The boy at the top of the slide has **potential energy**.
- As the boy moves down the slide, the **potential energy** changes into **kinetic energy**.



Check your understanding?

» Put (✓) or (X):

1. Chemical energy is a type of kinetic energy.
2. A compressed spring stores kinetic energy.

()

()

Activity 7 Types of Energy

» Energy is found everywhere around us.

Energy can be:

1

Changed (transformed) from one form to another.

Example:

When a roller coaster moves down a hill, its potential energy is changed into kinetic energy.

2

Transferred from one object to another.

Example:

When you kick a ball, kinetic energy transfers from your leg to the ball.

Energy Transformations:

Energy changes

Device

Flashlight



from

Chemical energy
(Stored in batteries.)

into

Light energy
and thermal energy

Gas oven



Chemical energy
(Stored in natural gas.)

Thermal energy

Spring-powered toy car



Potential energy
(Stored in the spring wire.)

Kinetic energy
and sound energy

Real car



Chemical energy
(Stored in gasoline.)

Kinetic energy,
sound energy
and thermal energy



NOTES:

- Energy can be stored in many different forms such as:
 - 1 The food we eat stores **chemical energy**.
(The digestive system breaks down the food into nutrients and change it into energy that is stored in the body.)
 - 2 The fuel in the car stores **chemical energy**.
(The car's engine transforms chemical energy stored in fuel into kinetic energy)



NOTE:

- New energy cannot be created and also existing energy cannot be destroyed.



Check your understanding?

» Complete the followig table:

Tool	Energy changes	
	From	Into
1 Electric lamp 		
2 Radio 		
3 TV 		
4 Electric fan 		
5 Door bell 		
6 Washing machine 		

Lesson Three

Answered

1 Choose the correct answer:

1. All types of energy can be classified into two main groups, which are (Cairo 2022)
 - (a) light and sound energies
 - (b) chemical and electrical energies
 - (c) potential and kinetic energies
 - (d) magnetic and thermal energies
2. The potential energy of an object depends on its (Cairo 2022)
 - (a) mass only
 - (b) speed only
 - (c) height from the Earth's surface only
 - (d) mass and height from the Earth's surface
3. When the spring is compressed, it stores energy. (Suez 2024)
 - (a) thermal
 - (b) potential
 - (c) light
 - (d) chemical
4. The chemical energy stored in batteries is considered a form of energy. (Alex. 2024/ Ismailia 2023)
 - (a) potential
 - (b) kinetic
 - (c) heat
 - (d) sound
5. When we turn on a television and energies are produced. (Cairo 2023)
 - (a) sound – chemical
 - (b) light – chemical
 - (c) sound – light
 - (d) solar – light
6. An object has the most potential energy at a height of (Dakahlia 2024)
 - (a) four meters
 - (b) three meters
 - (c) two meters
 - (d) one meter
7. When you turn a flashlight, the energy stored in its battery is converted into light energy which is a form of energy.
 - (a) gravitational potential – kinetic energy
 - (b) gravitational potential – chemical potential
 - (c) chemical potential – gravitational potential
 - (d) chemical potential – kinetic energy
8. All of the following are forms of kinetic energy expect the (Matrouh 2025)
 - (a) sound
 - (b) food
 - (c) light
 - (d) electricity
9. As a child moves down a slide, the potential energy changes into energy.
 - (a) light
 - (b) sound
 - (c) kinetic
 - (d) chemical

10. energy is considered a form of potential energy.
 (a) Sound (b) Electrical (c) Chemical (d) Thermal
11. When electrical energy flows through a light-bulb, it
 (a) changes into heat energy only (b) is destroyed
 (c) changes into chemical potential energy
 (d) changes into light and heat energies
12. All the following examples store chemical energy, except (Cairo 2024)
 (a) a battery (b) food
 (c) a compressed spring (d) natural gas
13. Which of the following is an example of a change of kinetic energy into gravitational potential energy?
 (a) A person sliding on a slide. (b) A person skiing down on a hill.
 (c) A car moving on a flat road. (d) A roller coaster moves up a hill.

2 Put (✓) or (X):

1. The battery stores chemical energy. (Kafr El-Sheikh 2023) ()
2. Sound and light energies transfer in the air in the form of waves. (Kafr El-Sheikh 2023) ()
3. Thermal energy is a type of kinetic energy. (Damanhur 2023) ()
4. A compressed spring stores potential energy. (Alex. 2024) ()
5. The chemical potential energy stored in the car fuel is converted into kinetic energy. (Cairo 2022) ()
6. In the electric fan, the kinetic energy is converted into electric energy. (Alex. 2022) ()
7. Energy doesn't transfer from an object to another. (Damietta 2024) ()
8. As the height of an object from the Earth's surface increases, its potential energy increases. (Suez 2023) ()
9. We can see the movement of electricity through a wire. (Suez 2023) ()
10. Energy is not destroyed, but it changes from one form to another. (Bent-sulf 2023) ()
11. Energy can be transformed from one form to another. (Cairo 2024) ()

12.  When an electric heater is turned on, it produces thermal energy. ()
13.  The energy stored in food is chemical energy. ()
14.  The energy stored in a spring is kinetic energy. ()
15.  Electrical energy is converted into light energy in the electric heater. ()

3 Correct the underlined words:

1. Chemical potential energy is the energy stored in a book placed on a table. ()
2.  The gasoline inside a car stores kinetic energy. ()
3. A fan turns chemical energy stored in natural gas into thermal energy. ()
(Alex. 2022)
4. In the door bell, electrical energy is converted into light energy. ()
5.  The gasoline inside a car stores kinetic energy. ()
6.  An example of potential energy is sound energy. ()

4 Write the scientific term:

1. It is a form of potential energy that causes objects to rush towards the Earth's surface. (Giza 2023) ()
2.  It is the energy that includes light energy. ()
3. The energy stored inside a battery. ()
4. It is a form of kinetic energy produced when turning on a washing machine and affects our ears. ()
5. It is a form of kinetic energy used to operate television. ()
6.  It is the energy stored in the gasoline inside a car. ()

5 Complete the following sentences:

1. During the explosion of fireworks, they release heat, light, and sound, which are considered forms of energy. (Cairo 2024)
2. energy helps in cooking. (Behiera 2023)
3. Batteries have potential energy in the form of stored energy. (Red Sea 2023)
4. When an electric lamp is turned on, energy is produced which affects your eyes.

5. Chemical energy is a form of energy, while light energy is the form of energy. (Menoufia 2023)

6.  As the mass of an object increases, its energy increases.

7. In gas oven, energy is converted into energy. (Giza 2022)

8.  In a flashlight, energy inside the batteries is converted into energy.

9.  As the height of an object from the ground increases, its energy increases.

10.  The forms of energy are divided into two main types which are energy and energy.

11.  When you clap your hands, energy is converted into energy.

12.  In an electric fan, energy is converted into energy.

6 Cross out the odd word:

1. Thermal energy – Chemical energy – Sound energy – Electrical energy (.....)

2. Guitar – Flashlight – Radio – Alarm bell (Cairo 2023) (.....)

3. Light energy – Thermal energy – Sound energy – Electrical energy. (El-Menoufia 2024) (.....)

7 Choose from column (A) what suits it in column (B):

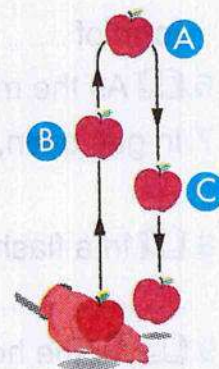
Column (A)	Column (B)
1. Clapping with your hands	(a) potential energy changes into kinetic energy.
2. Rubbing your hands together	(b) are types of fuel that store chemical energy.
3. Letting a compressed spring free	(c) kinetic energy changes into thermal energy.
4. Natural gas and gasoline	(d) kinetic energy changes into sound energy.

1. 2. 3. 4.

8 In the following figure, an apple is thrown upward:

Choose the correct answer:

- The apple at point (B) has
 (a) the most kinetic energy
 (b) the most potential energy
 (c) the least potential energy
- What energy transformation occurs when the apple falls down?
 (a) Kinetic energy changes into potential energy.
 (b) Chemical energy changes into kinetic energy.
 (c) Potential energy changes into kinetic energy.
- The apple at point (B) has than that at point (C).
 (a) more kinetic energy
 (b) less potential energy
 (c) more potential energy



9 Look at the following figures, then put (✓) or (X):



Figure (1)



Figure (2)

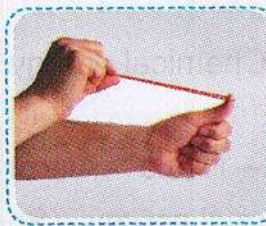


Figure (3)



Figure (4)

- The gas oven in figure (1) changes chemical energy in natural gas into sound energy. ()
- The thermal energy produced in figure (1) is a form of kinetic energy. ()
- The watermelon in figure (2) stores chemical energy, which is a form of kinetic energy. ()
- The blades of the fan in figure (2) rotate due to the transformation of electric energy into kinetic energy. ()
- Both the stretched rubber in figure (3) and the compressed spring in figure (4) store potential energy. ()

10 Give a reason for:

1. You feel warm when you rub your hands together.

.....
.....

2. There's an energy transformation when you turn on television.

.....
.....

3. The food we eat has energy

.....
.....

11 What happens if:

1. You transfer a book from the ground to a table?

(Cairo 2025) (According to its potential energy)

.....
.....

2. If a boy moves down the slide? (Giza 2025) (According to the change of energy)

.....
.....

3. You turn on the gas oven? (Cairo 2025) (According to the change of energy)

.....
.....

4. You switch on the electric fan in the house? (According to the change of energy)

.....
.....

5. You squeeze a spring?

.....
.....

Lesson

4

Activity 8 Easy Life Tool

- » Technology helped us invent robots that help us in many fields.
- » Robots were invented to make tasks easier.

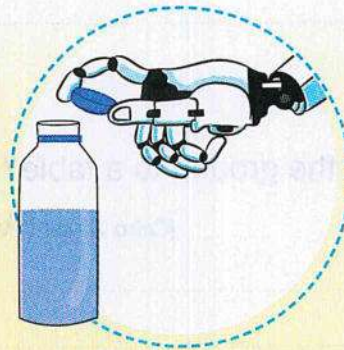
• اخترع الإنسان الروبوتات لتسهيل المهام.

• ساعدتنا التكنولوجيا في اختراع الروبوتات التي تساعدنا في العديد من المجالات.

Example: Robot hand

Function:

Opening the jar cap that is hard to be opened.



Source of Energy:

The robot is powered by batteries.

Energy Transformation:

Chemical energy stored in batteries,

is changed into

Electrical energy in the robot hand,

is changed into

Kinetic (mechanical) energy when the robot hand moves to open the bottle.

- » Energy is not created or lost when transferred from the battery to the robot hand.
- » Energy is converted from one form to another when the robot's hand opens the jar.

• الطاقة لا تُفنى أو تُستحدث من العدم؛ حيث انتقلت الطاقة من البطارية إلى يد الروبوت.
• يمكن تحويل الطاقة من صورة إلى صورة أخرى، كما حدث في يد الروبوت.

Activity 9 Record Evidence Like a Scientist

- » You have learned more about energy, motion, potential energy, kinetic energy and the different energy transformations.
- » Try to think like a scientist by writing your claim, your evidence and your scientific explanation about what you have learned.



Question:

- » How do moving objects get energy?



My Claim:



Evidence:



Scientific Explanation with Reasoning:

Lesson Four

Answered

1 Choose the correct answer:

1. Chemical energy is stored in the (Giza 2022/ Cairo 2023)
 - (a) food only
 - (b) battery only
 - (c) food and television
 - (d) food and battery
2. A battery stores energy which is considered as a form of energy.
 - (a) thermal – kinetic
 - (b) chemical – potential
 - (c) chemical – kinetic
 - (d) gravitational – potential
3. When you jump up, your potential energy increases because
 - (a) your mass only increases
 - (b) your mass only decreases
 - (c) your height from the Earth's surface increases
 - (d) both your mass and height from the Earth's surface increase
4. The book that put on the table stores energy. (Cairo 2025)
 - (a) sound
 - (b) light
 - (c) potential
 - (d) kinetic

2 Put (✓) or (X):

1. Energy doesn't change from one form to another. (Cairo 2023) ()
2. Gravitational force is an upward pulling force. (Cairo 2022) ()
3. Food is the source of energy for the human body. ()
4. Sound energy produced from playing the guitar is a form of kinetic energy. ()
5. Light energy is a form of potential energy. ()
6. When you drop a pen from your hand, the chemical potential energy stored in it changes into kinetic energy. ()

3 Correct the underlined words:

1. Any static object lying at a height from Earth's surface has kinetic energy.

(Assult 2023) (.....)

2. Food is the fuel used in cars to provide them with energy to move.

(.....)

3. When an apple falls from a tree, it gains potential energy. (.....)

4. Electrical energy and light energy transfer in the air in the form of waves.

(.....)

4 Write the scientific term:

1. It is the ability to do work or make a change.

(.....)

2. It is the energy stored in food and batteries.

(Alex. 2024) (.....)

5 Complete the following using the words between the brackets:

(food – potential – work – kinetic – light – chemical)

1. The form of energy that can be seen is energy that is considered as a form of energy.

2. A bicycle moving on a road and covers a certain distance is doing

3. Food and your phone battery store energy which is a form of energy.

4. Burning in our body provides us with chemical energy to do any activity.

6 Give a reason for:

1. A flashlight can't be operated without a battery.

.....
.....

2. Food is necessary for the human body.

.....
.....

Concept

2.3

Energy and Collisions



Concept 3

Energy and Collisions

Lesson 1

- | | |
|------------|--------------------------|
| Activity 1 | Can you Explain? |
| Activity 2 | Collision |
| Activity 3 | Watching Objects Collide |

Lesson 2

- | | |
|------------|-----------------|
| Activity 4 | Basics of Speed |
| Activity 5 | Racing Downhill |

Lesson 3

- | | |
|------------|----------------------------------|
| Activity 6 | Energy and Collision |
| Activity 7 | The Effect of Speed on Collision |

Lesson 4

- | | |
|-------------|--------------------------------------|
| Activity 8 | Speed and Collision |
| Activity 9 | The Effect of Mass on Collision |
| Activity 10 | Energy Conservation During Collision |

Glossary

Lesson (1)

Activity (1)

Collide	يصطدم	Knock down	تكسير	Steel	فولاذ	Light	خفيف
Building	مبنى	Swing	معلق	Object	جسم	Collision = crashing	تصادم
Construction workers	عمال البناء	Wrecking ball	كرة الهدم	Heavy	ثقيل	walls	حوائط
Cable	كابل	Truck	شاحنة				

Activity (2)

Cricket	لعبة الكريكت	Wooden bat	مضرب خشبي	Transfer	تنتقل	Direction	اتجاه
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Activity (3)

Suddenly	فجأة	Inflate	تنتفخ	Continue	يستمر	Passengers	ركاب
Sensors	المستشعرات	Steering wheel	عجلة القيادة	Safety equipment	وسائل الأمان	Automatically	تلقائيًا
Seatbelt	حزام الأمان	Air bag	الوسادة الهوائية	Continue	يستمر	Seats	المقاعد

Lesson (2)

Activity (4)

Physical measurement	كمية فيزيائية	Calculate	يحسب	inclined ramp	مستوى مائل	Distance	مسافة
Remains constant	يظل ثابتًا	Measure	يقيس	Speed	سرعة	Time	زمن

Activity (5)

Inclined ramp	مستوى مائل	Angel	زاوية	Edges	حواف	Inclination	الميل
---------------	------------	-------	-------	-------	------	-------------	-------

Lesson (3)

Activity (6)

Transfer	تنتقل	Get injured	يصاب	Severe	ضرر	Traffic sign	إشارة المرور
Change	تتغير	Vibrate	تهتز				

Activity (7)

Dangerous	خطير	Repair	يصلح	Damage	دمار	Severe	ضرر
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Lesson (4)

Activity (8)

Clay	صلصال	Drop	يسقط	Irregular	غير منتظم	Regular	منتظم
Floor	الأرض	Throw	يرمي				

Activity (9)

Engine	محرك	injured	يصاب	Bike	دراجة	vehicle	سيارة (مركبة)
Fuel	وقود	survive	ينجو				

Activity (10)

Marble ball	كرة البلي	Create	يخلق	Friction	الاحتكاك	Raise ball up	يرفع الكرة لأعلى
Conservation	تحولات	Store	تخزن	gradually	بالتدريج	Newton's cradle	بندول نيوتن
Destroy	يدمر	String	خيوط				

Lesson

1

Activity 1 Can You Explain?

What happens to objects when they collide?



- » A **fast-moving** object has more energy than a **slow-moving** object.
- » A **heavy** object has more energy than a **light** object.
- » An object with **more** energy will cause more damage than an object with **less** energy during collision.

Example of collision Wrecking Ball:

Description:

- A very heavy **steel** ball swings on a cable.

Function:

- It is used by construction workers to knock down walls or parts of buildings.



كرة الهدم:

• الوصف: هي كرة فولاذية ثقيلة معلقة بكابل.

• الوظيفة: تساعد عمال البناء على تكسير الحوائط أو أجزاء من المباني.

Activity 2 Collision

Collision in Cricket

- » Cricket is a popular game all over the world.
- » The player uses a **wooden bat** to hit the ball.

When the player hits a moving ball with a bat:

Kinetic energy transfers from the **bat** to the **ball**.



The speed of the ball **increases**.



The ball returns back in a **different direction**.



Collision always makes a **popping sound**.



• يُمسك اللاعب بمضرب خشبي لضرب الكرة.

• لعبة الكريكت هي لعبة معروفة حول العالم.

• عندما يضرب اللاعب الكرة:

- تزداد سرعة الكرة.

- تنتقل الطاقة الحركية من المضرب إلى الكرة.

- ينتج عن الاصطدام دائماً صوت.

- تعود الكرة في اتجاه مختلف.

During collision

Kinetic energy **transfers** from one object to another.

Some of the kinetic energy **changes** into sound energy.



Check your understanding?

» In the opposite figure, the player hits a tennis ball with a bat, put (✓) or (X):

1. Kinetic energy transfers from the ball to the bat during collision.
2. Both the speed and the direction of the ball change.



()

()

Activity 2 Watching Objects Collide

» What happens when a car stops suddenly?

- The driver's body continues to move **forward**. Because moving objects stay in motion until something stops them.



• ماذا يحدث عندما تتوقف السيارة فجأة؟

- يستمر جسم السائق في التحرك للأمام.
- حيث تظل الأجسام المتحركة في حالة حركة حتى يوقفها شيء ما.

Safety Equipment During Collision

1 Seatbelt

- It's used in cars to keep the driver and the passengers from moving **forward** during a collision (when the car stops suddenly). So seatbelts have saved thousands of lives.



حزام الأمان

• يُستخدم لمنع جسم السائق والركاب من التحرك للأمام وقت التصادم.

NOTE:

- A moving object will stay in motion if there's nothing stops it.

1 Airbag

Material: • It is made of a **thin nylon material**.

Location: • It is folded into:
steering wheel, dashboard, seats or doors.



• تُطوى داخل عجلة القيادة أو لوحة التابلوه أو المقاعد أو الأبواب.

الوسادة الهوائية • تُصنع الوسادة الهوائية من النايلون الخفيف.

Idea Of Operation

a During collision:

- The airbag **inflates** automatically. **GR**
Because the sensors in the car detect a crash.
• تنتفخ الوسادة الهوائية تلقائيًا بواسطة مستشعرات السيارة عند حدوث التصادم.

Function of sensors:

They tell the airbag to inflate and fill it with a gas to provide a soft cushion.

b After collision:

- The airbag **deflates** almost as fast as it inflates. **GR**
Because it has vents (holes) that allow the gas to come out of the airbag, so the driver can get out of the car.
• تنكمش الوسادة الهوائية تقريبًا بنفس سرعة انتفاخها، لوجود ثقب أو فتحات بها؛ حتى تسمح للشخص بالخروج من السيارة.

Importance

- It slows the speed of the driver's motion forward.
- It absorbs the energy of the driver and passengers during a collision.

• امتصاص طاقة السائق والركاب أثناء التصادم.

• تخفض سرعة حركة الجسم للأمام أثناء التصادم.



- Car airbags cannot protect people in severe collisions with trains.

• لا يمكن للوسائد الهوائية في السيارات حماية الأشخاص عند التصادم الشديد مع القطارات.

Collisions between Trains and Cars

- » Every year, there are many accidents in which a **train** hits a **car** that may be stuck on the train tracks.
- » Trains are much **larger** than cars and they can travel at a **high speed**.
- » The higher the **force** when objects collide, the more **dangerous** it will be during collision.



- تحدث العديد من حوادث تصادم القطارات بالسيارات التي تعلق في قضبانها كل عام.
- إن القطارات أكبر حجمًا من السيارات، وسرعتها عالية.
- كلما زادت قوة التصادم، زادت المخاطر أثناء التصادم.



Check your understanding?

» Complete the following sentences:

1. Airbags inflate automatically when detect a crash.
2. From safety equipment in cars are and
3. Airbags are folded inside cars', or
4. When the moving car stops suddenly , passengers will move
5. Airbag is made of
6. During collision airbag automatically.

Pony Exercises on

Lesson One

Answered

1 Choose the correct answer:

1. A fast-moving heavy object has than a slow-moving light one.
(a) more potential energy (b) less potential energy
(c) more kinetic energy (d) less kinetic energy
2. When the objects collide with each other, is transferred between them.
(a) time (b) distance (c) energy (d) nothing (Port said 2023)
3. Collision always produces energy. (Sohag 2023)
(a) solar (b) sound (c) potential (d) chemical
4. A wrecking ball is made of (Damietta 2024)
(a) nylon (b) wood (c) glass (d) steel
5. When the wrecking ball hits a building,
(a) kinetic energy transfers from the building to the ball
(b) kinetic energy transfers from the ball to the building
(c) energy is destroyed
(d) potential energy transfers from the ball to the building
6. In cricket game, the bat transfers its energy to the ball.
(a) potential (b) kinetic (c) thermal (d) chemical (Sohag 2023)
7. When Sarah hits a tennis ball with the bat, the of the ball will change.
(a) speed only (b) direction only
(c) mass (d) speed and direction
8. When a car stops suddenly, the passengers will move
(a) upward (b) forward (c) backward (d) downward (Cairo 2023, Alex. 2024, Giza 2024)
9. protect(s) the driver from moving forward on collision.
(a) Glass window (b) Dashboard (c) Seatbelt (d) Tires (Alex. 2023)
10. help(s) the airbags to deflate quickly after collision.
(a) Sensors (b) Vents (c) Seatbelts (d) Steering wheels

2 Put (✓) or (X):

1. A moving object will stay in motion if there's nothing stops it. ()
2. When a cricket bat hits a ball, its potential energy transfers to the ball. (Cairo 2023) ()
3. Seatbelts are one of the safety equipment in cars. (Cairo 2025, Damietta 2024) ()
4. When a moving car stops suddenly, the passengers move forward. (Cairo 2024) ()
5. Airbags are from the safety equipment in cars. (Suez 2024) ()
6. Seatbelts keep the driver and passengers from moving forward when the car stops suddenly. (Dakahlia 2024) ()
7. Because of the seatbelt, the driver cannot see the road clearly. (Fayoum 2024) ()
8. Airbags increase the speed of the driver during a car crash. ()
9. Vents found in airbags help them to inflate quickly after collision. ()
10.  When a car stops suddenly, the passengers rush backward. ()
11. After a car collision, the air bags deflate as fast as they inflate. (Alex., Cairo 2024) ()

3 Correct the underlined words:

1. In cricket game, the speed of the ball decreases when it is hit with the bat. ()
2. Seatbelts absorb the energy of the passengers during collision when they inflate. (Sohag 2023) ()
3. Airbags are made of thick wooden material. (Cairo 2025) ()
4. Vents detect a car crash and tell the airbag to inflate automatically with a gas. ()
5. A car causes more damage than a train on colliding with each other. ()
6. The wrecking ball is a ball of light mass. ()

4 Write the scientific term:

1. It is a heavy steel ball that swings on a cable, and it is used in the destruction of building parts. (Luxor 2023) (.....)
2. It is a safety equipment that prevents car passengers from moving forward when a car crashes. (.....)
3. It is a safety equipment that provides a soft cushion when it inflates automatically with a gas during a car crash. (.....)
4. They are found in airbags, and through which gas comes out to let them deflate. (.....)

5 Complete the following sentences:

1. The help to slow the speed of a person movement forward during a car crash. (Qalyobia 2024)
2. Airbags inflate automatically when in cars detect a crash. (Behiera 2023)
3. Airbags can be folded in the car's doors and
4. In game, the player hits the ball with a wooden bat.
5. Collision between moving objects always produces energy. (Kafr El-Sheikh 2023)
6. and are from the safety equipment during collision. (Alex. 2024)
7. In cars, prevents passengers from moving forward when the car suddenly stops. (Giza 2023)
8. A wrecking ball is made of
9. Energy is transferred when occurs.
10. A wrecking ball is used in
11. When a tennis ball hits the racket, we hear

6 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Seatbelts	(a) absorb the energy of passengers during collision.
2. Airbags	(b) are used to knock down building by colliding with them.
3. Wrecking balls	(c) keep the passengers in their places during a car crash.
4. A train	(d) may cause a massive damage during a crash.

1. 2. 3. 4.

7 Look at the following figure, then choose the correct answer:



Figure (1)



Figure (2)



Figure (3)

- In figure (1), when the car stops suddenly, the box will
 (a) not move (b) move forward (c) move backward
- The air bags in the car in figure (1) will during collision with a truck, then it will after collision.
 (a) deflate – inflate (b) inflate – deflate (c) be folded - inflate
- In figure (2), the ball speed increases and moves in different direction because
 (a) kinetic energy transfers from the bat to the ball
 (b) kinetic energy transfers from the ball to the bat
 (c) potential energy transfers from the bat to the ball
- In figure (3), is produced during collision between the ball and bowling pins.
 (a) kinetic energy (b) sound energy (c) chemical energy

8 Give a reason for:

1. The driver uses the seatbelt while driving.

(Cairo 2025)

.....

.....

2.  The airbags are very important equipment in the car.

.....

.....

3. Airbags deflate quickly after a car crash.

.....

.....

9 What happens if:

1. Airbags couldn't deflate after collision?

.....

.....

2. A cricket player hits the ball with the bat? (According to the speed of the ball)

.....

.....

3.  A ball collides with the tennis bat?

.....

.....

Lesson

2

Activity 4 Basics of Speed

- » Speed is a physical measurement of how fast an object is moving.
- » The speed of the moving object isn't affected by its direction.

Example:



If a runner moves 5 meters **forward** in one second and then returns 5 meters **backward** in one second, his speed **remains constant**.



لا تتأثر سرعة الجسم المتحرك باتجاه حركته.

السرعة كمية فيزيائية تُعبر عن مدى سرعة الجسم.

Speed

It is the distance traveled by an object per a unit of time.

السرعة: هي المسافة المقطوعة خلال وحدة الزمن.

How to Calculate an Object's Speed

- » We can calculate the object's speed by dividing the distance that the object covers by the time taken to cover this distance as follows:

$$\text{Speed} = \text{Distance} \div \text{Time}$$

Quantity	Measuring units	
Distance	Meter (m)	Kilometer (Km)
Time	Second (sec)	Hour (hr)
Speed	Meter per second (m/sec)	Kilometer per hour (Km/hr)

Problems:

- 1 Calculate the speed of a runner who runs **100 meters** in **10 seconds**

• Speed = $\frac{\text{Distance}}{\text{Time}} = \frac{100}{10} = 10 \text{ m/sec.}$



- 2 If Kenzy rides a bike and covers **150 m** in **15 seconds** to reach the supermarket, calculate the speed of the bike.

• Speed = $\frac{\text{Distance}}{\text{Time}} = \frac{\quad}{\quad} = \quad \text{m/sec.}$



- 3 From the following figures, which car is faster?

The black car traveled
50 meters in **2 seconds**.



Solution:

Speed = $\frac{\text{Distance}}{\text{Time}} =$
 $\frac{\quad}{\quad} = \quad \text{m/sec.}$

The white car traveled
60 meters in **2 seconds**.



Solution:

Speed = $\frac{\text{Distance}}{\text{Time}} =$
 $\frac{\quad}{\quad} = \quad \text{m/sec.}$

Comparing the Speed of One Body to Another

1 The relationship between speed and distance (At the same time)

» If two cars travel for 2 hours, and cover different distances:



Red car

Travels **300 km** in **2 hours**.

So its speed = $300 \div 2 = 150$ km/hr.



Green car

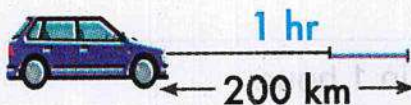
Travels **200 km** in **2 hours**.

So its speed = $200 \div 2 = 100$ km/hr.

Red car moves at a **higher speed**,
because it covers **longer distance** at the same amount of time.

2 The relationship between speed and time (At the same distance)

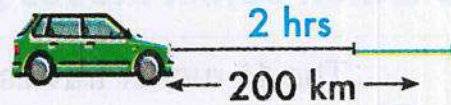
» If two cars take different amount of time to cover the same distances:



Purple car

Travels 200 km in **one hour**.

So, its speed = $200 \div 1 = 200$ km/hr.



Green car

Travels 200 km in **two hours**.

So, its speed = $200 \div 2 = 100$ km/hr.

Purple car moves at a **higher speed**,
because it covers **the same distance** at **shorter time**.

The speed of moving objects depends on:

1

The **distance** covered by the object.

2

The **time** taken to cover this distance.

To compare the speed of two moving objects:

- 1 The object that covers a **longer distance** at the same amount of time has a **higher speed**.
- 2 The object that covers the **same distance** in a **shorter time** has a **higher speed**.

• الجسم الذي يقطع أكبر مسافة في نفس الزمن هو الجسم الأسرع.

• الجسم الذي يقطع نفس المسافة في زمن أقل هو الجسم الأسرع.



Check your understanding?

» Which object moves faster?

1	The 1 st runner travels 6 kilometers in 1 hour.	
	The 2 nd runner travels 9 kilometers in 1 hour.	
2	The 1 st car travels 100 meters in 5 seconds.	
	The 2 nd car travels 100 meters in 8 seconds.	

Activity 5 Racing Downhill

» In this experiment, we will examine the relation between speed and kinetic energy of a moving object.

Tools:



Toy trucks



Cardboard



Four books



Paper cup



Scissors



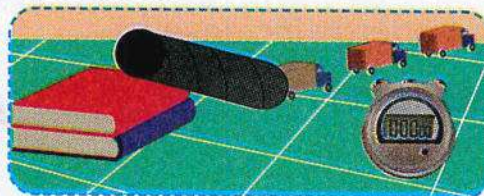
Stopwatch



Ruler

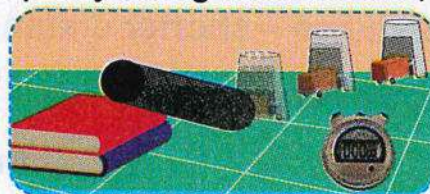
Part ① : Measuring speed:

- ① Set up an inclined ramp using two books and a cardboard as shown.
- ② Roll the toy truck down the cardboard tube.
- ③ Record the time that the toy truck takes to reach the end of the tube using a stopwatch.
- ④ Repeat the previous steps by using three books, then four books.
- ⑤ Record your results in the table.



Part ② : Measuring kinetic energy:

- ① Cut a hole in the side of the cardboard large enough to allow the truck to enter without hitting any of its edges.
- ② Put the paper cup at the end of the cardboard tube.
- ③ Roll the toy truck down the tube.
- ④ Measure the distance that the paper cup moves by using a ruler.
- ⑤ Repeat the previous steps by using three books, then four books.



Observations:

Number of Books	Part (1)	Part (2)
	Time (toy truck takes)	Distance (cup travels)
2 books	4 seconds	2 cm
3 books	2 seconds	4 cm
4 books	1 second	6 cm

- As the angle of inclination increases:
 - The speed of the truck increases.
 - The kinetic energy of the truck increases.

Conclusion:

- Both of **speed** and **kinetic energy** increase by increasing the angle of inclination.

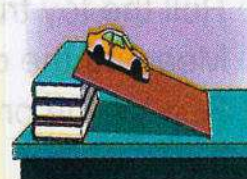


Check your understanding?

» Study the following figure, then choose the correct answer:

1. By increasing the number of books,
the car covers a

(longer distance – shorter distance)



2. By decreasing the number of books, the car's speed

(increases – decreases)

Lesson Two

Answered

1 Choose the correct answer:

- All the following describe the speed except
 (a) it is measured in kilometer per hour
 (b) it is the travelled distance per unit time
 (c) it is affected by the direction of an object's motion
 (d) it is measured in meter per second
- How can we calculate the speed of an object? (Alex. 2022)
 (a) $\text{Speed} = \text{Distance} \div \text{Time}$ (b) $\text{Speed} = \text{Distance} + \text{Time}$
 (c) $\text{Speed} = \text{Distance} \times \text{Time}$ (d) $\text{Speed} = \text{Distance} - \text{Time}$
- The measuring unit of the distance is (Cairo 2022)
 (a) km/s (b) km (c) seconds (d) kg
- Which of the following is a measuring unit of speed? (Menofia 2023)
 (a) hr/km (b) sec/m (c) kg/sec (d) m/sec
- The result of dividing the travelled distance by time taken to cover it equals (Cairo 2022)
 (a) energy (b) force (c) mass (d) speed
- The speed of the train which covered 400 m in 2 sec equals m/sec. (Alex. 2024)
 (a) 400 (b) 100 (c) 200 (d) 2
- If a bicyclist took an hour to travel 10 km from his house to the club so his speed was
 (a) 10 km/hr (b) 20 km/hr (c) 10 m/sec (d) 20 m/sec
- Which of the following cars has the smallest amount of kinetic energy?
 (a) Car (A) covers 100 meters in one second.
 (b) Car (B) covers 200 meters in two seconds.
 (c) Car (C) covers 100 meters in two seconds.
 (d) Car (D) covers 200 meters in one second.
- If Magdy takes 2 hours to cover a distance of 140 km, if he slows down his speed, he will take to travel the same distance.
 (a) 2 hours (b) more than 2 hours
 (c) less than 2 hours (d) less than one hour

10. When the kinetic energy of a moving body , its speed

- (a) increases, increases (b) decreases, increases
(c) increases, doesn't change (d) decreases, doesn't change

(Sharkia 2023)

11. If two similar toy cars are moving down on the same ramp at the same speed, they

- (a) have different kinetic energies
(b) have the same kinetic energy
(c) cover different distances
(d) will not reach the end of the ramp at the same time

12. Trucks use loading ramp to of an object moving down on them.

- (a) decrease the speed
(b) decrease the kinetic energy
(c) increase the mass
(d) increase the speed



13. In the following figure, by increasing the angle of inclination of the ramp, the

- (a) speed of the ball decreases
(b) kinetic energy of the ball increases
(c) distance covered by the ball decreases
(d) both speed and kinetic energy of the ball decrease



2 Put (✓) or (X):

1. The speed is distance per unit time. (Cairo 2024) ()
2. Kilogram is from measuring units of speed. (El-Menoufia 2024) ()
3. We can measure the covered distance in kilometer unit. (Cairo 2024, Minia 2023) ()
4. When the speed of a car increases, its kinetic energy increases. ()
5. The speed of the car that covers 75 meters in 3 seconds is 25 km/hr. ()
6. The speed of a truck decreases when it takes a longer time to cover the same distance. ()

7. If two cars cover equal distances at the same amount of time, they move at the same speed. ()
8. As an object moves slower its kinetic energy increase. (Qalyobia 2024) ()
9. If the angle of inclination of a surface increases, the speed of a rolling body on it increases. (Cairo 2024) ()
10. The angle of inclination of a ramp affects the speed of the object moving on it, but it doesn't affect its kinetic energy. ()

3 Correct the underlined words:

1. Kilometer and kilogram are measuring units of the distance. (.....)
2. Kilometer per hour is the measuring unit of distance. (.....)
3. By increasing the potential energy of an object, its speed increases. (.....)
4. Speed = distance × time (.....)
5. A horse is faster than a human as it covers a shorter distance at the same amount of time. (.....)
6.  The speed decreases by increasing the distance. (.....)

4 Write the scientific term:

1. It is the distance traveled by a moving object in a unit of time. (.....)
2. It is a measurement of how fast an object is moving. (.....)
3. It is the form of energy that increases by increases a moving object's speed. (.....)
4.  It is a physical quantity determined by distance and time. (.....)

5 Complete the following sentences:

1. The distance covered per unit time is (Cairo 2024)
2. To calculate the speed of a moving object, we need to know two factors which are and
3. A car's speed moving down on an inclined ramp is than that moving on a flat road.

4. By decreasing the angle of a ramp inclination, the speed of an object moving down on it will
5. If Noor travels with her bicycle a distance of 20 km in two hours, she is traveling at a speed of km/hr. (Dakahlia 2024)
6. When the speed of a car increases, its energy increases. (Suez 2023)
7. The speed increases by increasing the of the ramp.
8. or are from the measuring units of speed.
9. The kinetic energy of a body increases with increasing its
10. The distance traveled by a body is measured in
11. Speed depends on two main factors, which are and

6 Cross out the odd word:

- Speed – Energy – Distance – Time (Bent-suif 2023) (.....)

7 Look at the following figures, then choose the correct answer:

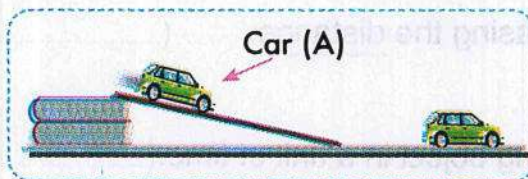


Figure (1)

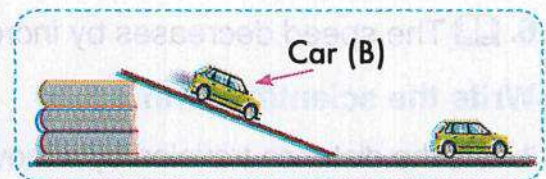


Figure (2)

1. The speed of car (A) is the speed of car (B).
 (a) more than (b) equal to (c) less than
2. The angle of inclination of the ramp in figure (2) is than that in figure (1), so the kinetic energy of car (B) is than that of car (A).
 (a) smaller - smaller (b) greater - greater (c) smaller – greater
3. By increasing the number of books of the ramp in figure (2) to 4 books, the of car (B) will increase.
 (a) speed only (b) kinetic energy only (c) both a and b

8 Look at the opposite figures, then answer:



1. If the two cars moved at the same time for 20 seconds, car (A) covered a distance of 100 meters, while car (B) covered a distance of 300 meters.

2. Which of the two cars moves at a greater speed?

(Gharbia 2022)

9 Problems:

1. Calculate the speed of a train that covers 600 Km in a time of 6 hours. (Giza 2024)

2. Calculate the speed of a train that covers 500 kilometers in a time 5 hours.

(Dakahlia 2022)

3. What is the speed of train which travels 400 kilometers in 2 hours? (Menofia 2022)

4. Calculate the speed of train that covers 450km in a time of 3 hours.

(Cairo, Dakahlia 2025)

10 Give a reason for:

1. The angle of inclination of a ramp affects the speed of the object moving down on it.

2. The kinetic energy of a moving object depends on its speed.

11 What happens to:

1. The speed of a toy car rolling down on a ramp on increasing its angle of inclination?

2. The kinetic energy of a toy car rolling down on a ramp on decreasing its angle of inclination?

3. The kinetic energy of a car if its speed increases?

Lesson

3

Activity 6 Energy and Collision

» In this activity we will explore the effect of collision on object.

Collision

It is the crashing (bumping) of two objects into each other.

التصادم: هو لحظة اصطدام جسمين متحركين.

When two cars collide with each other:

Energy transfers between them.

يحدث انتقال للطاقة.

Energy changes from a form to another.

يحدث تحولات للطاقة.

Example:

What happens if

A boy is running fast and hits a traffic sign post?

The boy may stop moving and bounce off and may get injured.

يتوقف الولد عن الحركة للأمام، وقد يتعرض للإصابة.



The traffic sign post may vibrate (wobble).

قد تهتز إشارة المرور.

From the previous example, we conclude that:

- Kinetic energy transfers from the **boy** to the **traffic sign**, so it vibrates.
- Some of the kinetic energy changes to **sound** and **heat** energies during collision.

• تنتقل الطاقة الحركية من الولد لإشارة المرور فتتهتز إشارة المرور. • يتحول جزء من الطاقة الحركية إلى طاقة صوتية وحرارية أثناء التصادم.



Check your understanding?

» Put (✓) or (x):

- There is an energy transfer between two objects when they crash into each other. ()

Activity 7 The Effect of Speed on Collision

» Driving fast is very dangerous.

» In this activity, we are going to study the effect of speed on collision.

The kinetic energy of an object depends on:

Object's mass

Object's speed

1 Effects of speed on collisions:



As the speed of the object increases.

The kinetic energy of the object increases.

More energy is transferred during collision, and some of this energy may be in the form of heat, light, or sound.

Comparison between fast-moving objects and slow-moving objects:

Fast-Moving Objects

Slow-Moving Objects

Energy

• They have **more** energy.

• They have **less** energy.

During a Collision

• They exert **more force**, which causes a **big damage** that cannot be repaired.

• They exert **less force**, which causes **less damage** that can be repaired.

• الأجسام السريعة طاقتها أكبر.
• عند التصادم تكون قوتها أكبر، وتسبب ضررًا أكبر لا يمكن إصلاحه.

• الأجسام البطيئة طاقتها أقل.
• عند التصادم تكون قوتها أصغر، وتسبب ضررًا أصغر يمكن إصلاحه.



2

Effects of direction on collisions:

What happens during collision between:

Two cars moving at different speeds and in the **same** direction?

- The damage will be **less** severe because they exert a small force during collision.



Two cars moving at different speeds and in the **opposite** directions?

- The damage will be **more** severe because they exert a great force during collision.



» When a fast object hits another slow object:

- Kinetic energy transfers from the fast object to the slower object.
- Some of the extra energy changed into heat, light, or sound energies.

عندما يصطدم جسم سريع بآخر:

• تنتقل طاقة الحركة للجسم الآخر، وتتحول بعض الطاقة الزائدة إلى طاقة حرارية أو ضوئية أو صوتية.



Check your understanding?

» In the following figure the boy hits the rubber ball with different forces, Put (✓) or (x)

- You can hear a louder sound, when the boy hits the ball with great force. ()
- During collision, kinetic energy transfers from the ball to the wooden bat. ()



Lesson Three

Answered

1 Choose the correct answer:

1. energy is transferred between two objects during a collision.
(a) Potential (b) Thermal (c) Electrical (d) Kinetic
2. The effect of a collision depends on all the following factors, except the of the colliding objects.
(a) direction (b) speed (c) color (d) mass
3. is the factor that affects both potential and kinetic energy of an object.
(a) Speed (b) Mass
(c) Height from the Earth's surface (d) Time
4. All the following energies are involved during a collision, except energy.
(a) sound (b) thermal (c) electrical (d) kinetic
5. During a collision, all the following may occur, except that
(a) energy is transferred (b) energy changes to other forms
(c) energy is destroyed (d) a damage takes place
6. When a fast-moving bike collides with a traffic sign, all the following happen, except that
(a) potential energy is produced (b) sound energy is produced
(c) the bike stops (d) the traffic sign vibrates
7. Which accident causes the greatest damage that can't be repaired?
(a) Two slow cars collide in opposite directions.
(b) Two fast cars collide in the same direction.
(c) Two slow cars collide in the same direction.
(d) Two fast cars collide in opposite directions.
8. On collision, the damage resulted from a car is train on moving at the same speed.
(a) more than (b) less than (c) equal to (d) typical to
9. A motorbike that moves at a speed of causes the most damage during collision.
(a) 50 km/hr (b) 70 km/hr (c) 110 km/hr (d) 100 km/hr

2 Put (✓) or (X):

1. The driver must drive fast to avoid accidents. ()
2. Speed transfers when collision occurs between a ball and a bat. (Sohag 2023) ()
3. As an object moves slower its kinetic energy increases. (Qalyobia 2024) ()
4. The effect of collision increases, when the speed of the object decreases. ()
5. Energy is created during collision. ()
6. A big-mass vehicle exerts more force during collision than a small vehicle. ()
7. By increasing the object's kinetic energy, it exerts more force during a collision. ()
8. The object's kinetic energy depends on its speed and mass. ()
9.  The direction of movement of an object affects the force of its collision. ()

3 Correct the underlined words:

1. A slow-moving object has more energy than a fast-moving object. (.....)
2. Collision between two objects usually produces kinetic and heat energies. (.....)
3. A severe damage occurs when two cars are moving in the same direction(s) collide. (.....)
4. During the collision of two objects, the kinetic energy transfers from the slower object to the other one. (.....)

4 Write the scientific term:

1. It is the process in which two objects crash into each other. (Ismailia 2023) (.....)
2. It is a form of energy that depends on an object's speed and mass. (.....)
3.  It is the audible energy produced during a collision. (.....)

5 Complete the following sentences:

1. When the speed of object decreases, its kinetic energy
(Suez 2024)
2. When the speed of an object increases, the energy that transfers during collision
3. During collision, energy transfers from the faster object to the slower object.
4. A slow-moving object has kinetic energy than a fast moving object.
5. When a car collide with another car moving in an opposite direction, its speed
6.  occurs when two bodies bump or crash into each other.
7.  Energy is transferred when occurs.
8.  Kinetic energy increases by increasing the and of an object.
9.  When the mass of a body increases, the force of collision
10.  The risk of collision increases by increasing the and of the objects.

6 Study the following figures, then answer the questions below:

1. The following figures represent different collision situations, complete the following sentences by using the words below:

(severe – car – cyclist – truck – light post)



Figure (1)



Figure (2)



Figure (3)

- (a) In figure (1), kinetic energy transfers from the to the
- (b) In figure (2), the causes more damage.
- (c) In figure (3), the is exposed to injuries when a bike collides with a moving car.

2. Which figure represents occurrence of the most dangerous collision? and why?



Figure (1)

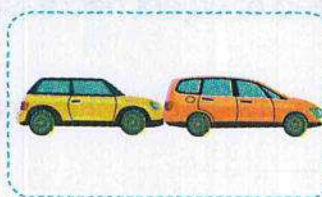


Figure (2)

7 Give a reason for:

1. Driving fast is so dangerous.

2. Collision between two objects usually produces a pop sound.

3. The larger body in the mass does more damage during collision. (Port Said 2025)

8 What happens if:

1. Two cars moving in the same direction collide with each other? (Cairo 2025)

2. Two cars moving in opposite directions collide?

3. A fast-moving car collides with another slow-moving one?

(According to caused damage)

4. Two bodies collide with each other?

5. The speed of a body increases? (According to its kinetic energy)

Activity 8 Speed and Collision

» In this experiment, we will study the effect of force and speed of a moving object on its kinetic energy.

Steps:

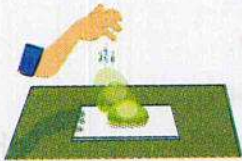
- 1 Drop a regular shaped clay ball from your hand on the floor.

إذا سقطت كرة الصلصال.



- 2 Throw the clay ball with weak force on the floor.

عند رمي كرة الصلصال برفق.



- 3 Throw the clay ball with a hard force on the floor.

عند رمي كرة الصلصال بقوة.



Observations:

The shape of the ball changes a **little** and becomes irregular.

يتغير شكل الكرة قليلاً.

The shape of the ball changes **more** and becomes more irregular.

يتغير شكل الكرة بصورة أكبر.

The shape of the ball changes **much more** and becomes completely irregular.

يتغير شكل الكرة بصورة أكبر جداً.

Conclusions:

- As the **force** applied on an object increases, its **speed** and **kinetic energy** increase during collision, and more damage will happen to this object.

• مع زيادة القوة المؤثرة على الجسم المتحرك، تزداد سرعة الجسم المتحرك، وتزداد الطاقة الحركية له أثناء الاصطدام؛ وبالتالي سيحدث المزيد من الضرر لهذا الجسم.

Activity 9 The Effect of Mass on Collision

The Relationship Between the Mass of the Objects and Their Kinetic Energy

- » Cars and trucks have different masses as a truck is much heavier than a car.
- » If a truck and a car moving with the same speed, the truck has more energy than the car, so trucks need bigger engines than cars.

The truck:

Has a **big mass**.
Has a **big engine**.
Consumes **more fuel**.
Has **more kinetic energy**.



The car:

Has a **small mass**.
Has a **small engine**.
Consumes **less fuel**.
Has **less kinetic energy**.



Give a reason for:

- The truck needs a bigger engine to move than the car.
 - Because the truck has a much larger mass than of the car.

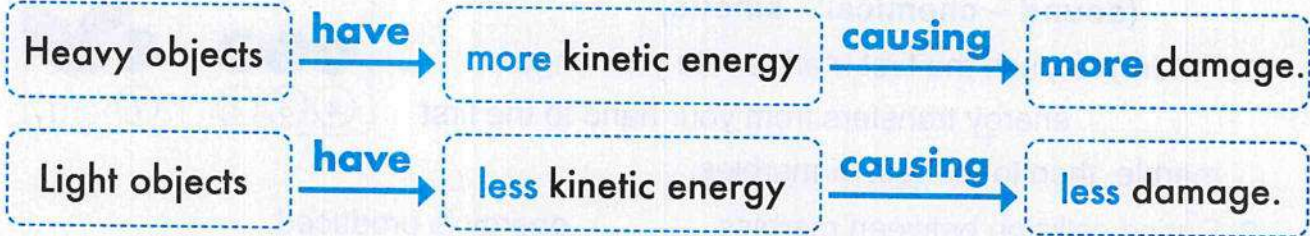
What happens when:

- ① A vehicle moves faster? (Concerning the consumed fuel)
 - The vehicle consumes more fuel and its kinetic energy increases.
- ② The mass of an object doubles? (Concerning its kinetic energy)
 - The kinetic energy of the object will increase.

Effect of Mass on Collisions

» As an object's mass **increases**, its kinetic energy **increases**.

• كلما زادت كتلة الجسم زادت طاقة حركته.



What happens if:

A **bike** moving with a speed of 50 km/hr hits a person?



The person may get injured and he will survive.

عندما تصطدم دراجة تتحرك بسرعة 50 كم في الساعة بشخص، ربما يصاب فقط، ولا خطر على حياته.

A **car** moving with a speed of 50 km/hr hits a person?



The person's life may be in danger.

عندما تصطدم سيارة تتحرك بسرعة 50 كم في الساعة بشخص، تتعرض حياته لخطر شديد.

Check your understanding?

» Put (✓) or (x)

1. As the force acting on a moving body increases, its speed decreases.

()

2. When a vehicle moves faster, it consumes less fuel.

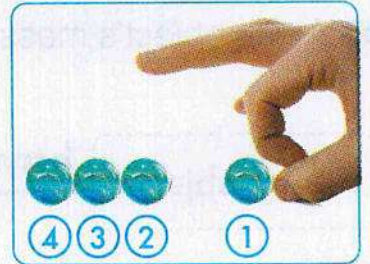
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Activity 10 Energy Conservation During Collision

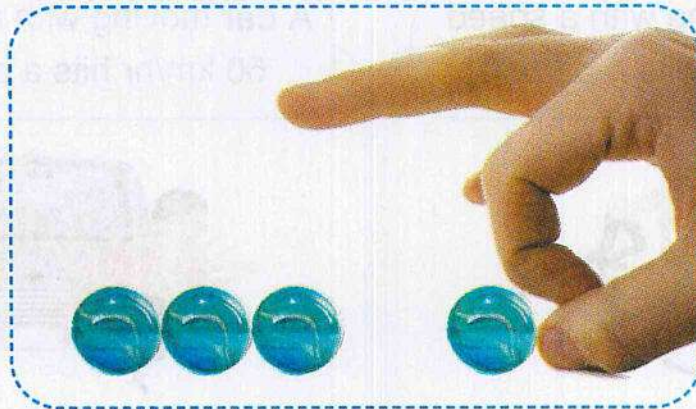
Complete the following sentences using the words between brackets:

(sound – chemical – kinetic)

1. When you push the first marble with your finger, energy transfers from your hand to the first marble, then to the rest of marbles.
2. During collision between marbles, energy is produced.



When you play a game with marble:

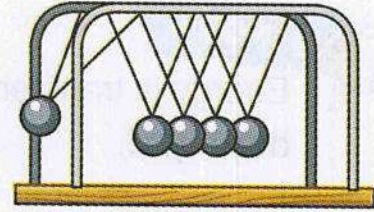


- » Kinetic energy is transferred from your hand to the 1st marble then to the 2nd one and so on.
- » Some of the kinetic energy is converted into sound energy, so we hear a click sound during collision between marbles.

عندما تلعب بكرات البلي الصغيرة:

- تنتقل الطاقة الحركية من يدك إلى كرة البلي الأولى، ثم إلى الثانية، وهكذا.
- تتحول بعض الطاقة الحركية إلى طاقة صوتية؛ لذلك نسمع صوت طقطقة أثناء الاصطدام.

Energy Transformation in Newton's Cradle



1 When the ball is raised up without leaving it go:

- The ball stores **potential energy**, and doesn't have any kinetic energy.

• عند رفع كرة البندول لأعلى، تختزن الكرة طاقة وضع ولا تمتلك أي طاقة حركية.

2 When the ball is left to move towards the rest balls:

- Potential energy is converted gradually into **kinetic energy**.

• عند ترك الكرة لتتحرك، تتحول طاقة الوضع تدريجيًا لطاقة حركية.

3 When the ball is left to move towards the rest balls:

- Most of the ball's kinetic energy transfers from the first ball to the rest of the balls.
- Some of the kinetic energy of the first ball is converted during collision into:

1 **Sound energy** produced during the **collision** between the balls.

2 **Thermal energy** due to the **friction** between:

- The strings and other parts of the cradle
- The balls during collision
- The air and the balls during their motion

عندما تصطدم الكرة بأولى الكرات:

• تنتقل الطاقة الحركية للكرة الأولى؛ ومن ثمّ لبقية الكرات.

• تتحول بعض الطاقة الحركية لـ:

1 طاقة صوتية أثناء التصادم بين الكرات.

2 طاقة حرارية؛ بسبب الاحتكاك بين الخيط والأجزاء الأخرى، وبين الكرات وبعضها، وبين الهواء والكرات، أثناء التصادم.

In Newton's cradle

The distance moved by the moving balls on the right side.



The distance moved by the moving balls on the left side.



The amount of energy before collision.

The amount of energy after collision.



The number of moving balls on the right side.

The number of moving balls on the left side.



NOTE:

- Energy is transferred and converted into other forms, but it can't be destroyed.

What happens when:

① You leave the balls in Newton's cradle moving long enough?

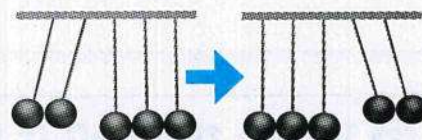
- Their kinetic energy decreases gradually until they stop moving after a while.

② Friction occurs between Newton's cradle string and its other parts?

- Some of the kinetic energy is converted into thermal energy.

③ You pull two balls in Newton's cradle, then leave them to collide with the rest of the balls?

- Kinetic energy transfers from them to the rest of the balls, and two balls will move on the other side.



Give a reason for:

- Energy is conserved and can't be destroyed during collision between the balls of Newton's cradle.

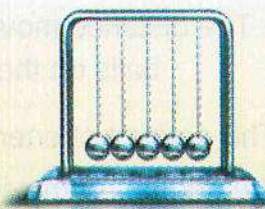
- Because the amount of energy before collision is equal to the amount of energy after collision.



Check your understanding?

» Put (✓) or (x):

1. If two balls in Newton's cradle hit the rest of the balls, only one ball will move on the other side. ()
2. In Newton's cradle, the amount of energy before collision is equal to that after collision. ()



Lesson Four

Answered

1 Choose the correct answer:

1. On pushing a marble towards some other marbles, energy transfers from your hand to the marbles.
 (a) thermal (b) kinetic (c) potential (d) sound
2. By increasing the force acting on an object, its kinetic
 (a) becomes zero (b) remains constant
 (c) increases (d) decreases
3. A car with a speed of kilometers per hour consumes the least amount of fuel.
 (a) 20 (b) 50 (c) 100 (d) 150
4. All the following affect the kinetic energy of an object, except
 (a) the object's mass (b) the object's speed
 (c) the object's color (d) the force acting on the object
5. When two objects are collided to each other, the amount of energy after collision is the amount of energy before collision. (El-Menoufia 2024)
 (a) equal to (b) less than (c) more than (d) not equal
6. When you raise the first ball of Newton's cradle, it stores energy.
 (a) light (b) kinetic (c) potential (d) sound
7. On raising up a ball of Newton's cradle for....., it stores the greatest amount of potential energy.
 (a) 2 centimeters (b) 4 centimeters (c) 5 centimeters (d) 3 centimeters
8. In Newton's cradle, all the following gradually decrease by passing time except the
 (a) balls' kinetic energy (b) balls' speed
 (c) travelled distance by balls (d) balls' mass
9. In Newton's cradle, when the ball moves towards the other balls, its potential energy
 (a) equals zero (b) increases (c) decreases (d) remains constant

10. All the following energies are included in Newton's cradle during collision except

(a) kinetic energy

(b) sound energy

(c) thermal energy

(d) light energy

11. In Newton's cradle, the moving balls' kinetic energy decreases gradually until they stop because

(a) energy is destroyed

(b) energy is created

(c) kinetic energy changes into light energy

(d) some kinetic energy changes into sound, thermal energies

2 Put (✓) or (x):

1. A large vehicle causes more damage as it hits a small vehicle moving with the same speed. (Alex. 2023) ()

2. When the force acting on an object increases, its ability to do work increases. ()

3. As the mass a moving object increases, its kinetic energy decreases. ()

4.  The thermal energy produced by the pendulum is due to the force of gravity. ()

5. On leaving moving balls of Newton's cradle long enough, their kinetic energy will increase gradually. ()

6. In Newton's cradle the number of balls moving at the right side is equal to that moving on the left side. ()

7.  Mass is one of the factors that affect speed. ()

8.  Energy before collision is not equal to the energy after collision. ()

3 Correct the underlined words:

1. A very big truck needs a very small engine to move. (.....)

2. A big truck consumes less fuel than a small car. (.....)

3. A small vehicle that moves at low speed has a great amount of kinetic energy. (.....)

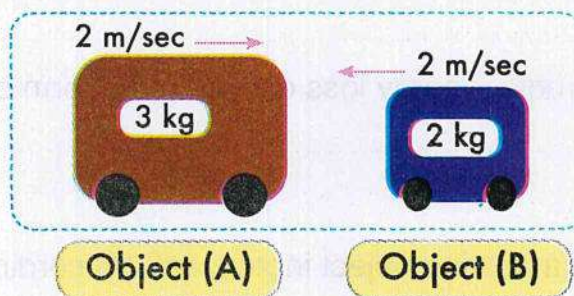
4. Speed and time are the factors affecting an object's kinetic energy. (.....)

5.  When the speed of a body increases, the force of the collision decreases. (.....)

4 Complete the following sentences:

1. On throwing a clay ball strongly into a wall, it will exposed to damage than that being thrown slightly.
2. If two different sized vehicles moving at the same speed, the bigger vehicle has kinetic energy than the small one.
3. On raising up two balls of Newton's cradle, then leaving them to collide with the rest balls move(s) on the other side.
4. If you leave the moving balls in Newton's cradle long enough, their kinetic energy will gradually until they
5. In Newton's cradle, part of the kinetic energy changes into energy during collision between balls, and also changes into energy due to friction between parts of the cradle.
6.  The total energy before the collision is the total energy after the collision.
7.  Newton's cradle loses energy in the form of and energies.

5 Look at the following figure, then choose the correct answer:



1. The kinetic energy of the object (A) is (**more – less**) than that of the object (B), because it has (**more speed – more mass**).
2. When the two objects collide with each other,
(**object (B) exerts more force – object (A) exerts more force**)
3. When the two objects collide with each other,
(**energy transfers between them – energy is destroyed**)

6 Look at the following figure, then choose the correct answer:

1. On raising the first ball upward without leaving it, its energy becomes zero.

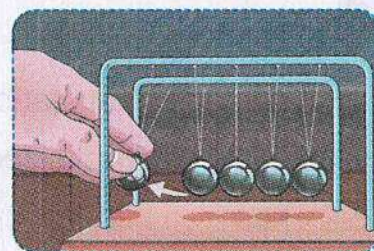
(a) potential (b) kinetic (c) sound

2. On raising the first ball upward without leaving it, it stores energy.

(a) thermal (b) kinetic (c) potential

3. Due to friction between the strings and other parts of Newton's cradle, some kinetic energy changes into energy.

(a) potential (b) kinetic (c) thermal



Newton's Cradle

7 Give a reason for:

1. A moving truck consumes more fuel than a moving car to reach the same speed.

.....

2. In Newton's cradle, kinetic energy of moving balls decreases gradually by passing time.

.....

3. Energy is conserved during collision between the balls of Newton's cradle.

.....

4.  In a Newton's cradle, energy loss occurs in the form of thermal energy.

.....

8 What happens if:

1. The force acting on a moving object increases? (According to its speed)

.....

2. Raising up a ball of Newton's cradle without leaving it?

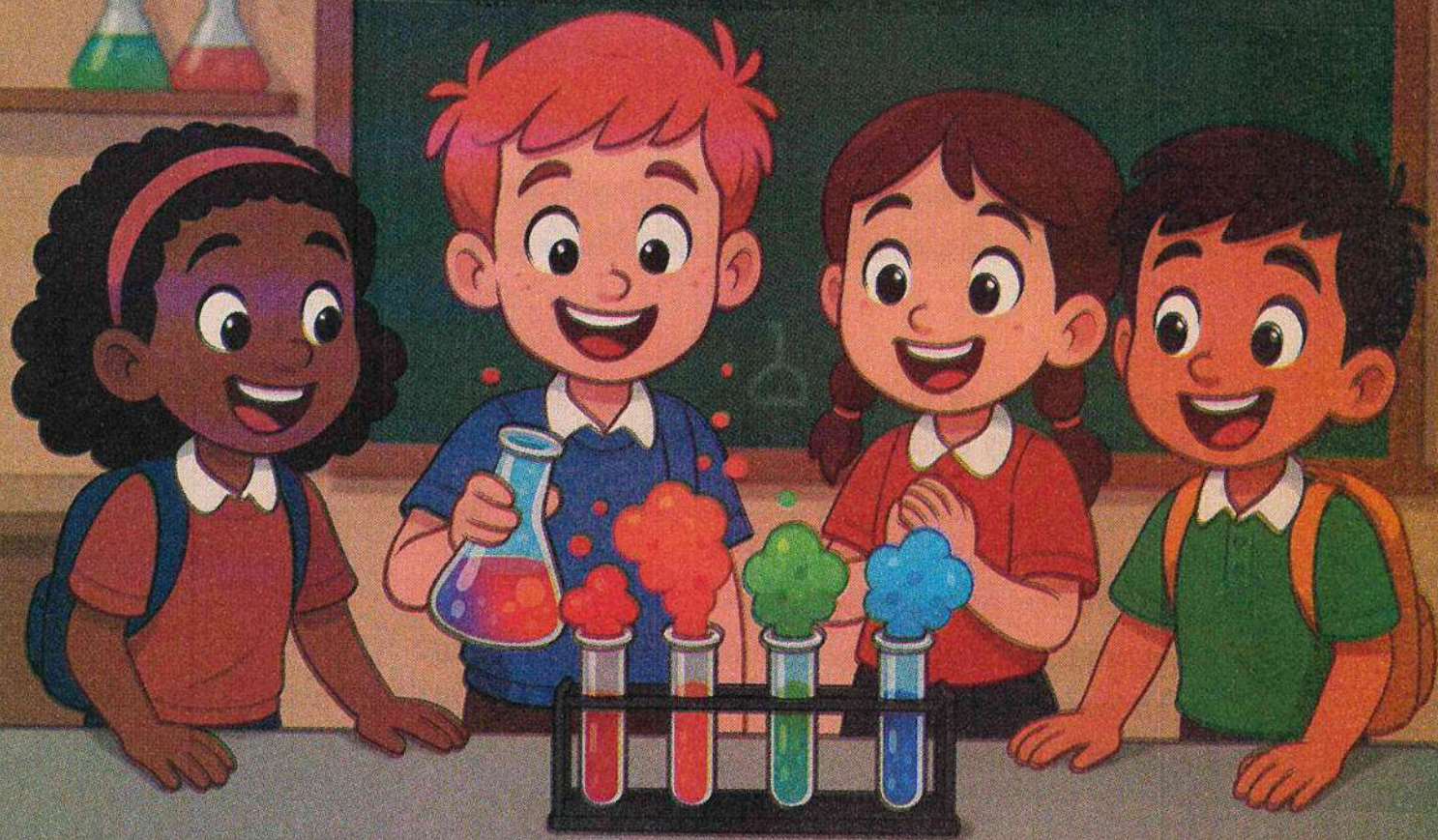
.....

3. You leave the moving balls in Newton's cradle long enough?

(According to their kinetic energy)

.....

Projects



Studying Bats



» Bats are **nocturnal animals**. (They are active at night.)

الخفافيش كائنات ليلية؛ أي تنشط في الليل.



» Bats, like bees and butterflies, can help **plants and flowers**.

الخفافيش مثل النحل والفراشات تستطيع مساعدة النباتات.



» Bats can fly fast like birds.

الخفافيش تستطيع الطيران بسرعة كالطيور.



» Bats locate their prey, such as mosquitoes, using a property called **echolocation**.

الخفافيش تستخدم خاصية تحديد الموقع بالصدى لمعرفة مكان الفريسة مثل البعوض.

How do bats locate things in the dark?

Bats use a property known as "**echolocation**" to locate their prey and hunt in total darkness.

• تستخدم الخفافيش خاصية تحديد الموقع بالصدى الصوت لتحديد مواقع الفرائس في الظلام.



How bats locate things:

- ① A bat produces high-pitched sound waves through air.
- ② When these waves hit any object, it returns back to the bat so that it can detect the location of the prey.

• يرسل الخفاش موجات صوتية في الهواء.

• عندما ترتطم الموجات بأي جسم فإنها ترتد إلى الخفاش فيستطيع تحديد موقع الفريسة.

Interdisciplinary project **The Sinai Agama Lizard**

Habitat

It lives in the dry and rocky environments of Eastern Egypt.

Food

They feed on ants, grasshoppers, beetles, termites, and other insects.



Agama lizard

In order to survive in this harsh environment, this little **reptile** undergoes some structural and behavioral adaptations.

Structural Adaptation:

- 1 It has a long, thin body that allows it to climb rocks and run quickly.
- 2 It has a scaly skin that traps the water in.
- 3 It has a sticky tongue to catch its prey.

Behavioral Adaptation:

- 1 It is active during the hottest parts of the day.
- 2 It likes to hang out in areas with many rocks, hard gravel, and boulders.
- 3 It saves its energy by hiding between rocks, and it attacks its prey when it comes nearby.
- 4 It stands on the top parts of its toes to keep its belly high above the hot rocks.

The number of Sinai agama lizards' decreases due to some human activities, such as:

- 1 Changing their natural habitat to build roads and sidewalks.
- 2 Catching them to be sold as pets.

Vehicle safety

- » Modern vehicles are designed with a lot of safety features, such as **seatbelts** and **airbags**, to keep the driver and passengers safe.
- » Airbags absorb the energy of the car during the collision.
- » Airbags are made of **nylon** material and are folded inside the steering wheel, seats, dashboard, or doors.
- » During a collision, **sensors** tell the airbag to inflate quickly with the gas to provide a soft cushion for the driver or passengers.



Seatbelt



Airbag



2026

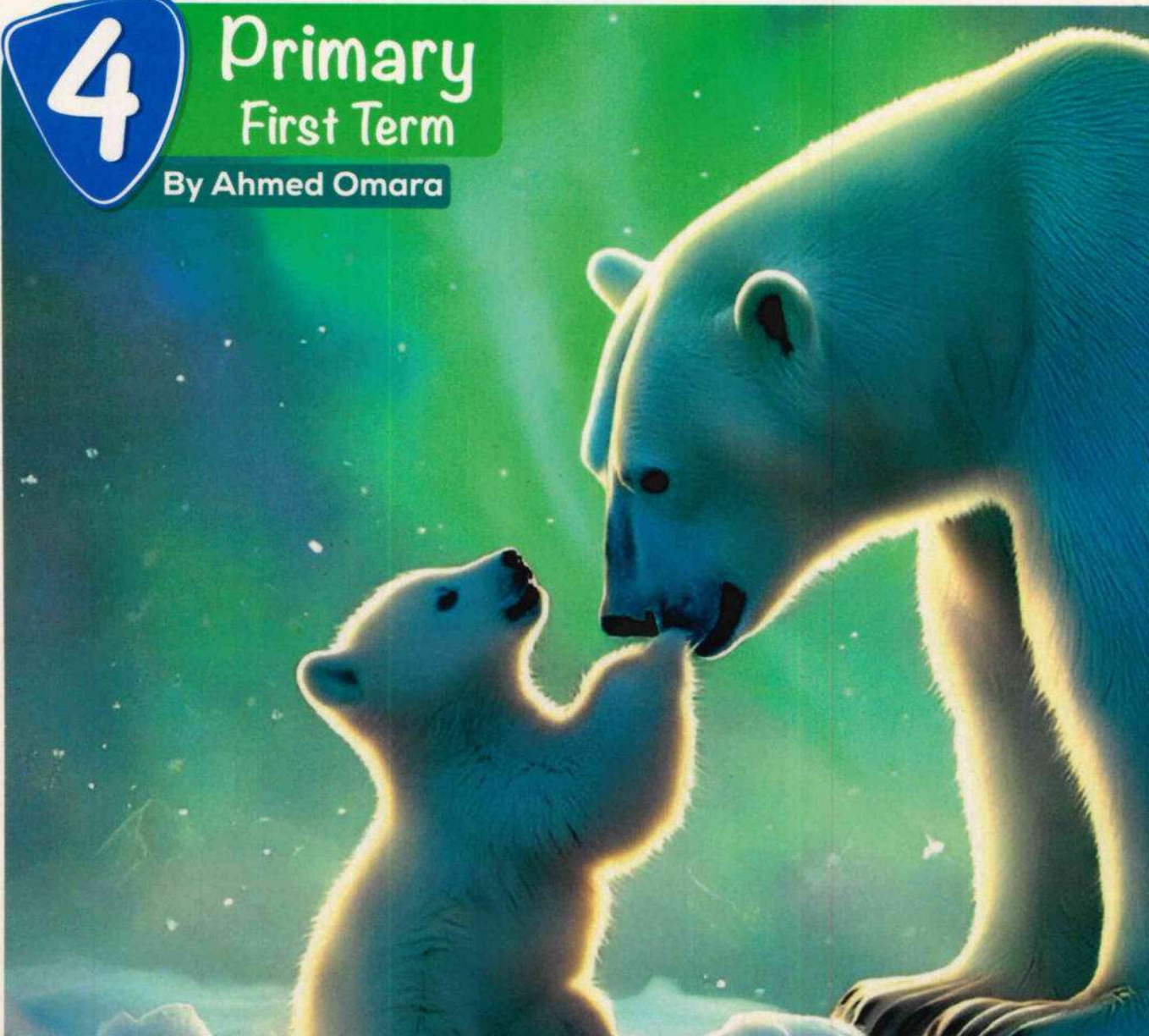
Science

Revision Book



Primary
First Term

By Ahmed Omara





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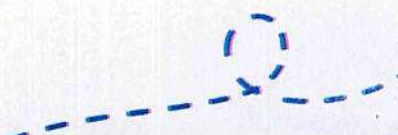
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Final Revision



Revision on Concept 1.1

Adaptation and Survival

1 Definitions

Adaptation	They are the characteristics that help living organisms survive and reproduce in their ecosystem.
Ecosystem	It is an area in which living organisms and nonliving things interact with each other.
Habitat	It is the environment where a living organism lives.
Structural adaptation	It is a change in a living organism's body structure to help it survive.
Behavioral adaptation	It is a change in a living organism's behavior or acts to help it survive.
Camouflage	It is a type of adaptation in which an animal blends in with the surrounding environment to hide from predators or sneak up on prey.
Countershading	It is a camouflage strategy in which the bull shark has a dark back and a white belly.
Predator	It is an animal that hunts (eats) another animal.
Prey	It is an animal that is hunted (eaten) by another animal.
Penguin	It is a non-flying bird that has a thick fat layer and dense feathers on its body.
Camel	It is an animal that stores fat in its hump to adapt to the desert environment.
Caracal	It is a cat with tan-colored fur that lives in the desert.
Polar bear	It is a bear that has white, thick fur and lives in Arctic region.
Black (brown) bear	It is a bear that has dark fur and lives in forests.

Fennec fox	It is a fox that has sandy-colored fur and lives in deserts.
Arctic fox	It is a fox that has white fur in winter and brown fur in summer.
Bull shark	It is an organism that uses a countershading strategy to hunt.
Agama lizard	It is a lizard with colorful scales that adapted to live in the desert.
Panther chameleon	It is a lizard that can change the color of its scales and adapted to live in tropical rainforests.
Amazon rainforest	It is a rainforest that is characterized by its strong wind and soggy soil.
Savannah	It is a grassland habitat that has drought conditions.
Kapok tree	It is an umbrella-shaped tree that grows in Amazon rainforests.
Acacia tree	It is an umbrella-shaped tree that grows in savannah grasslands.
Taproots	They are very long roots that grow directly downward in acacia trees.
Buttress roots	They are wide and large roots that fix the kapok tree firmly to the soggy soil.
Pine tree	It is a tree that adapted to survive in snow and has a triangular shape.
Water lily	It is a tree that has wide leaves floating on water to absorb sunlight.
Mangrove tree	It is a tree that grows in salt water and has a strong, long root to resist water waves.
System	It is a group of organs that work together to perform a job (function).
Digestion	It is the process of breaking down food into smaller pieces to provide the body with nutrients.

Digestive system	It is the system that breaks down food into tiny pieces so the body cells can use them for energy.
Respiratory system	It is the system responsible for breathing (respiration).
Respiration	It is the process of pulling the air in the body and pushing the air out of the body.
Inhalation	It is the process of pulling the air in the body.
Exhalation	It is the process of pushing the air out of the body.
Oxygen	It is the gas needed for respiration for all living organisms.
Carbon dioxide	It is the gas expelled out of the body during respiration.
Air pollution	It is a type of pollution that makes it hard for human to breathe.
Water pollution	It is a type of pollution that makes it hard for human to find clean drinking water.
Soil pollution	It is a type of pollution that makes the crops can't grow.
Amphibians	They are living organisms that can live on land or in water.
Endangered species	They are the species that a great loss in the number of their members.
Extinction	It is the continuous decrease in the number of individuals of an organism until the death of all its members.

2 Importance

Mouth	It is the organ where the digestion of food starts.
Teeth	They crush (break) the food during chewing.
Tongue	It mixes the crushed food with saliva.
Saliva	It is a liquid substance in the mouth that moistens food.

Pharynx	- It is a common passage for both food and air. - It is an organ that pushes food into the esophagus. - It is an organ that pushes air into the trachea.
Esophagus	It is a long, muscular tube that moves food to the stomach.
Stomach	It is a muscular organ that mixes the food with acidic and digestive juices (enzymes) until the food becomes a soupy liquid.
Liver and pancreas	They pour juices into the small intestine that help break down food into nutrients.
Small intestine	The nutrients are absorbed through the walls of the small intestine to enter into the tiny blood vessels.
Large intestine	It is an organ that absorbs water from the undigested food.
Anus	The solid waste (stool) leaves the body through it.
Nose	It is the first organ of the respiratory system through which air enters the body.
Trachea	It is a tube that allows air to pass to the two lungs and it is divided into two bronchi at its end.
Two bronchi	They allow air to enter the two lungs and they are divided into smaller tubes that look like trees' branches called bronchioles.
Two lungs	They have two balloon shapes, and they are responsible for gas exchange through a structure called the alveoli.
Alveoli	They are tiny air sacs surrounded by blood vessels where oxygen is transferred through them to the blood stream.
Diaphragm	It is a large muscle that has an important role during inhalation and exhalation.
Gills	They allow fish to extract oxygen from water.
Skin	It is a structure that allows amphibians to extract oxygen from water.

3 Give a reason for:

- ① A camel stores fat in its hump.
 - To adapt to the dry and hot desert environment.
- ② The starred agama lizard is always looking for shaded areas in the desert.
 - To keep its body cool during hot, sunny days.
- ③  The penguin's body has a thick layer of fat and dense feathers.
 - To keep its body warm in the extreme cold weather.
- ④  The blood vessels in the penguin's feet weave around each other.
 - To protect its toes from freezing as the warm blood vessels heat up the cold blood vessels.
- ⑤ Desert lizards have colorful scales.
 - To hide among the colorful rocks in the desert.
- ⑥ A fennec fox has tan-colored fur.
 - To hide and blend in with the desert environment.
- ⑦  A polar bear has white fur.
 - To hide and blend in with the snow.
- ⑧  A polar bear has thick fur.
 - To keep its body warm in the cold weather.
- ⑨ Brown bears and black bears have dark fur.
 - To hide among the trees in the forest.
- ⑩  Some animals have the ability to use camouflage strategy.
 - To hide from their predators or sneak up on their prey.
- ⑪  An Arctic fox has short ears and legs.
 - To stay warm in the cold weather.
- ⑫  A fennec fox has extra-large ears.
 - To lose heat and cool its body.
- ⑬  A fennec fox pants like a dog.
 - To cool its body.
- ⑭ An Arctic fox has thick fur.
 - To keep its body warm in extreme cold weather.

- 15  The fur of the Arctic fox is white in winter and brown in summer.
- To sneak up on its prey in any season.
- 16 Fennec foxes hide in burrows during the day.
- To stay cool during hot, sunny days in the desert.
- 17 Arctic foxes hide in burrows at night.
- To stay warm during cold nights in tundra.
- 18 Both fennec foxes and Arctic foxes eat different kinds of food.
- Because it is hard to find food in the hot desert or the tundra desert.
- 19  Bull sharks have less competition for finding food in fresh water.
- Because other types of sharks live in salt water only.
- 20 Bull sharks use a camouflage strategy called countershading in hunting.
- To sneak up on their prey during hunting.
- 21 The eyes of a panther chameleon move independently (in different directions).
- Because the panther chameleon uses one eye to find food and the other eye to avoid danger.
- 22  A panther chameleon has V-shaped feet and a tail like a hand.
- To hold the branches of trees tightly.
- 23  Acacia trees have very long roots that grow downward (taproots).
- To get water from the deep soil.
- 24 The branches of acacia trees gather on the top of its trunk.
- To prevent animals from reaching their leaves.
- 25 Acacia trees have sharp spines around their leaves.
- To prevent animals from eating their leaves.
- 26 Acacia trees use wind to communicate with other trees.
- To send smelly messages to nearby acacia trees to produce poison if there is danger nearby.
- 27  A kapok tree has large, wide roots that grow up around the trunk (buttress roots).
- To fix the tree firmly in the soggy soil.

- ②8 A kapok tree has hand-shaped leaves.
- To allow wind to move gently through its leaves without cutting them.
- ②9 A pine tree has a triangular shape and short branches.
- To allow the snow to slide on it without breaking its branches.
- ③0  Water lilies have wide floating leaves.
- To absorb a large amount of sunlight.
- ③1 Mangrove trees have long and strong roots.
- To resist the water waves.
- ③2 Palm trees have thick roots and small leaves.
- To resist the strong wind.
- ③3 Barbary figs have sharp spines.
- To prevent animals from eating their fruits and leaves.
- ③4 The human body is made up of different systems.
- To perform different functions and to keep living organisms alive.
- ③5 The human body needs energy.
- To survive, grow, and carry out vital processes.
- ③6 The teeth play an important role in digestion.
- Because teeth break down food into smaller pieces.
- ③7 The tongue plays an important role in digestion.
- Because the tongue mixes the food with saliva.
- ③8 Saliva plays an important role in swallowing food.
- Because saliva moistens the food to facilitate its swallowing.
- ③9 The juices of the liver and pancreas are important.
- To help in breaking down food into nutrients.
- ④0 The small intestine is an important organ in the digestive system.
- Because the nutrients are absorbed through the walls of the small intestine to enter the blood.
- ④1 The large intestine is an important organ in the digestive system.
- Because it absorbs water from the undigested food and turns it into solid waste.
- ④2 The anus is an important organ in the digestive system.
- Because solid waste leaves the body through it.

- 43  The inhaled air differs from the exhaled air.
- Because the inhaled air is rich in oxygen gas, while the exhaled air is rich in carbon dioxide gas.
- 44 The diaphragm plays an important role in the respiration process.
- Because during inhalation, the diaphragm contracts and moves downward, while during exhalation, the diaphragm relaxes and moves upward.
- 45  Gills are unique structural adaptation in fish.
- Because they enable fish to absorb oxygen from water.
- 46 Car and factory exhausts have bad effects on the environment.
- Because they produce smog, which causes damage to the lungs, asthma, and breathing problems.
- 47  Frogs can live in water.
- Because their skin can absorb oxygen gas from the water.
- 48 The dry season is very harmful for amphibians.
- Because their skin must be wet all the time to extract oxygen gas from water.
- 49 Pollution of air and water can affect the survival of amphibians.
- Because they breathe oxygen gas from water and air, so they are sensitive for any pollution.
- 50 Scientists must study how amphibians interact with their environments.
- To help them survive and protect them from extinction.

4 What happens if:

- 1 The penguin has no feathers or a fat layer on its body?
- It cannot adapt to the cold weather and it will die.
- 2 The warm blood vessels and cold blood vessels in the penguins' feet do not weave around each other?
- The penguins' toes will freeze.
- 3 The polar bear has thin fur instead of thick fur?
- It cannot adapt to the cold weather and it will die.

- ④  **The polar bear has dark fur instead of white fur?**
- It will not be able to hide from its prey, so it can't get food.
- ⑤ **The Arctic fox has a white coat during all seasons of the year?**
- It cannot hide from its prey in summer, so it can't get food.
- ⑥  **A fennec fox has short ears?**
- It will not be able to cool its body.
- ⑦  **An Arctic fox has long ears?**
- It will not be able to warm its body.
- ⑧ **The sense of hearing becomes weak in foxes?**
- They cannot hunt their prey.
- ⑨  **A bull shark moves from an area of salt water to an area of fresh water?**
- It will find less competition in finding food.
- ⑩ **A panther chameleon is exposed to danger?**
- It puffs up its body with air, opens its mouth wide, and changes the color of its scales.
- ⑪  **The length of the acacia taproots is short?**
- The roots cannot get water deep in the soil.
- ⑫  **There are no buttress roots in the kapok tree?**
- The kapok tree cannot stay firmly in the soggy soil.
- ⑬ **A pine tree doesn't have a triangular shape?**
- The snow will break its branches.
- ⑭ **The trunk of a kapok tree becomes very short?**
- The kapok tree won't get the needed sunlight, so it will die.
- ⑮ **A water lily has narrow leaves instead of wide leaves?**
- It cannot absorb a large amount of sunlight.
- ⑯ **A mangrove tree has short and weak roots?**
- It cannot resist the water waves.
- ⑰ **A barbary fig has no spines?**
- Animals will eat its fruits easily.

18) The small intestine doesn't exist in the human body?

- Nutrients will not be produced and the digestive system cannot perform its functions.

19) The diaphragm moves downward during inhalation?

- The chest size increases and the air rich in oxygen gas enters the lungs.

20) The diaphragm moves upward during exhalation?

- The chest size decreases and the air rich in carbon dioxide gas comes out of the lungs.

21) The exhausts from cars and factories increase in big cities?

- Smog increases, causing breathing problems, damage of lungs, asthma, and heart diseases.

22) Water pollution increases (for human and fish)?

- Humans cannot find clean water to drink, and fish will die.

23) Water pollution increases in the natural habitat of amphibians?

- The number of amphibians will decrease.

24) The skin of frogs becomes dry?

- They cannot survive and they will die.

5 Summary

Adaptations

They are the characteristics that help living organisms survive and reproduce in their **ecosystem**.

- If a living organism **adapts**, it **survives** and **reproduces**.
- If a living organism **can't adapt**, it **dies** or goes **extinct**.

Types of Adaptations:

Structural Adaptation

- It is a change in a living organism's **body structure** to help it survive.

- 1 Polar bears have white fur.
- 2 Blood vessels in a penguin's feet.
- 3 Camel stores fat in hump.

Behavioral Adaptation

- It is a change in a living organism's **behavior or acts** to help it survive.

Examples:

- 1 Bird migration
- 2 Desert lizards look for shade.

1 Adaptation in Animals:

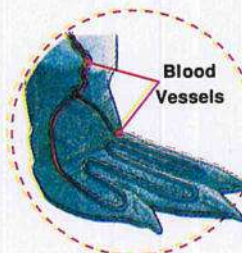
Penguin

Habitat (Antarctica)



Penguin's body:

A penguin has a **thick fat layer** and **dense feathers** on its body to keep its body warm in the cold weather.



Penguin's feet:

- 1 Blood vessels bring **cold** blood **up** from the feet to the body.
- 2 Other blood vessels bring **warm** blood **down** from the body to the feet.
- 3 The blood vessels **weave around each other**, so the warm blood vessels **heat up** the cold blood vessels and the **heat transfers** to the penguin's feet.

Camouflage

It is a type of adaptation in which an animal blends in with the surrounding environment to hide from **predators** or sneak up on its **prey**.

		Habitat	Way of Adaptation
1 Polar Bear		Arctic Regions	It has thick fur. To keep its body warm. It has white fur. To blend in with the snow to sneak up on the prey.
2 Black Bear and Brown Bear		Forests	They have dark fur. To hide among trees during hunting.
3 Caracal and Fennec Fox		Deserts	They have tan-colored fur. To hide and blend in with the desert environment.
4 Desert lizards		Deserts	They have colorful scales. To hide among the rocks in the desert.

Bull Shark

Lives in fresh and salt water



Structural Adaptation	• Its body is adapted to survive in salt water and fresh water. • It uses a camouflage strategy called "countershading", as it has a dark back and a white belly to sneak up on the prey. • It has sharp teeth to cut the prey's flesh.
Behavioral Adaptation	• It can hunt during the day and at night to surprise its prey. • It feeds on different types of food (It has a varied diet).

Note: In fresh water, a bull shark has less competition for finding food.

		1 Fennec Fox (Habitat: Desert)	2 Arctic Fox (Habitat: Tundra)
			In Winter  In Summer 
Structural Adaptation	Fur	It has tan (sandy) fur. To hide in the desert environment.	It has a thick fur coat. To stay warm. It has white fur in winter and brown fur in summer. To hide from the prey in any season.
	Ears	It has extra-large ears. To lose heat and cool its body.	It has short ears and legs. To help it stay warm.
Behavioral Adaptation		It pants like dogs. To cool its body.	
		They hide in burrows to overcome extreme climate, where: • A fennec fox stays cool in burrows on sunny days . • An Arctic fox stays warm in burrows at night . They eat different kinds of food (they have a varied diet), such as insects , fruits , plant roots and prey remains . Because it is hard to find any food in the desert.	

Panther Chameleon

Habitat: Tropical rainforests

Structural Adaptation	• It has bright-colored scales. - To blend in with the green leaves and colorful flowers. • Its eyes move in opposite directions independently. - One eye searches for food, and the other eye avoids danger. • It has V-shaped feet and a tail like a hand. - To hold the branches of trees tightly.	
Behavioral Adaptation	In danger, it scares its attacker by: - Puffing up its body with air. - Opening its mouth wide. - Changing its scales color.	

2 Adaptation in Plants:

- Plants can grow **everywhere**, and they have **structural** and **behavioral** adaptations, like animals, that help them **survive** in different environments.



Some Structural Adaptations of Different Plants

Plant	Habitat	Structural Adaptation	Reason
1 Water Lily	Wetland (Fresh water)	• It has wide leaves floating on the water.	• To absorb a lot of sunlight.
2 Palm Tree	Desert	• It has a thick trunk and narrow leaves.	• To resist the strong wind.
3 Pine Tree	Snow	• It has a triangular shape and short branches.	• To allow the snow to slide easily over the branches without breaking them.
		• It has needles instead of leaves.	• To prevent water loss.
4 Mangrove Tree	Salt water	• It has long and strong roots.	• To resist the water waves.
5 Barbary Fig	Desert	• It has sharp spines and a tough outer cover.	• To prevent animals from eating its leaves and fruits.

P.O.C.	Acacia Tree	Kapok Tree
		
Habitat	Savannah (In Africa) • It is a grassland habitat. • The temperature is mild. • There is a lack of water (drought conditions).	Amazon rainforests (In Brazil) • It has soggy soil. • It is characterized by strong winds. • There is a plenty of water (it is easy to find water).
Shape	Both of them are “ umbrella-shaped trees. ”	
Structural Adaptation		
Roots	• Taproot (grows downwards) - It reaches 35 meters below the surface. To search for water deep in the soil.	• Buttress roots (grow upwards) - To fix the tree firmly in the soggy soil.
Trunk	• Its trunk stores water, just as camels store fat in their humps. • It has a very long trunk, so most animals, except giraffes, can't reach its leaves.	• The length of the tree exceeds 70 meters to reach the sunlight.
Leaves	• It has tiny leaves To hold water. • It has sharp spines To protect it.	• It has hand-shaped leaves with narrow parts. To allow the wind to move gently without tearing them.
Behavioral Adaptation		
	When a giraffe eats its leaves: • It produces poison. • It sends smelly messages to nearby trees to start producing the same poison.	It sends messages through the wind, to spread: • Its delicious-smelling flowers to attract bats. • The tree's fluffy yellow seeds.

Human Digestive System

Digestion

It is the process of breaking down food into smaller pieces to provide the body with nutrients.

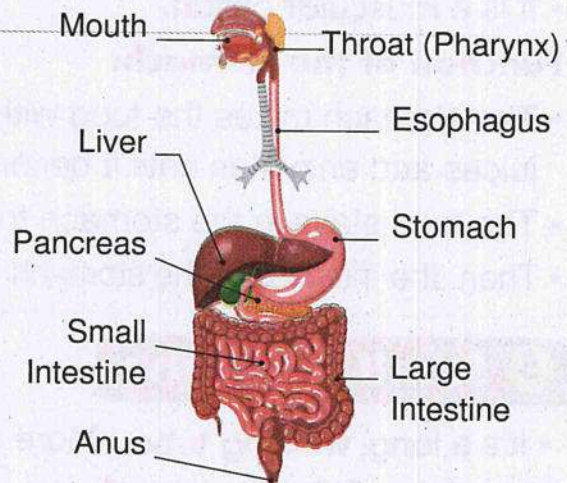
Function of the digestive system:

The digestive system breaks down the food so the body can use it to get energy.

Important Note:

- The digestive system starts with the **mouth** and ends with the **anus**.

Digestion Process Pathway:



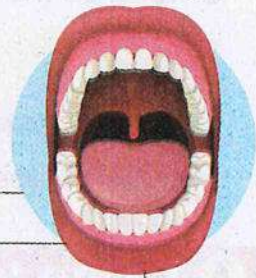
How does the digestive system work?

1 Mouth

- The digestion of food starts in the **mouth**.

Mouth contains:

- | | |
|---------------|---|
| Teeth | • They crush (break) the food during chewing. |
| Saliva | • It is a liquid substance that moistens the food.
• It breaks down the food chemically . |
| Tongue | • It mixes the crushed food with saliva. |



2 Pharynx (Throat)

- When you swallow, your throat pushes the food into the esophagus.



3 Esophagus

- It is a **long, muscular tube** that pushes food down to the stomach.

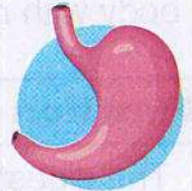


4 Stomach

- It is a **muscular organ**.

Function of the stomach:

- The stomach mixes the food with the acidic digestive juices and enzymes until it becomes a **soupy liquid**.
- The food stays in the stomach for a **few hours**.
- Then, the muscles of the stomach move the food into the **small intestine**.



5 Small Intestine

- It's a **long, winding tube**. (More than **six meters** long)

Function of the liver and pancreas:

- They pour juices into the small intestine that help break down food into **nutrients**.

Function of the small intestine:

- The nutrients are absorbed through the walls of the small intestine to enter into the tiny blood vessels.

Then:

- The **digested food (nutrients)** is carried by the **blood** to all body parts.
- The **undigested food** flows into the **large intestine**.

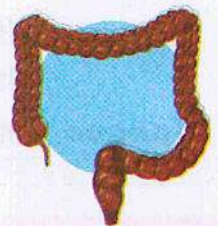


6 Large Intestine

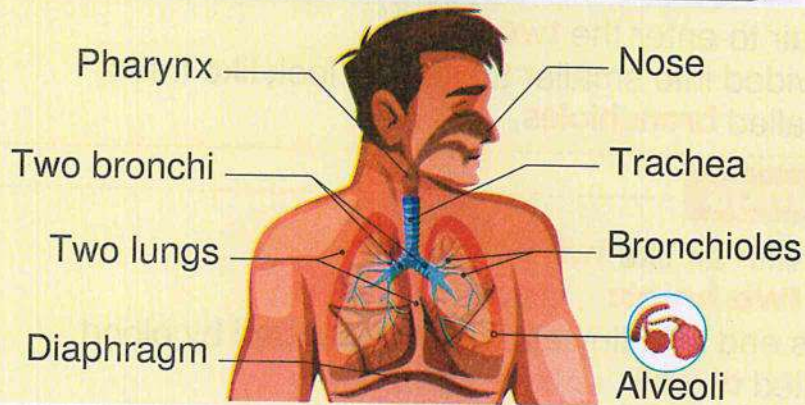
- It's a **wide tube** that starts at the end of the small intestine and ends with the anus.

Function of the large intestine:

- It absorbs **water** from the undigested food so it becomes solid waste.
- Solid waste leaves the body through the **anus**.



Human Respiratory System



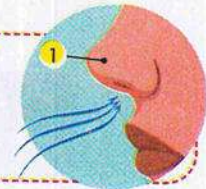
Respiration Pathway



How does the respiratory system work?

1 Nose

- The nose is the **first organ** of the respiratory system.
- Air enters the body through the **nose** and **mouth**.



2 Throat (Pharynx)

- It exists in the **digestive** and **respiratory** systems.
- It is a common path for **food** and **air**.

The pharynx moves **air** into the **trachea**.



The pharynx moves **food** into the **esophagus**.

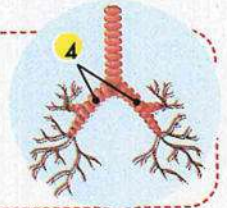
3 Trachea

- It's a tube that allows air to pass to the **two lungs**.
- Inside the lungs, the trachea is branched into two smaller tubes called "**two bronchi**".



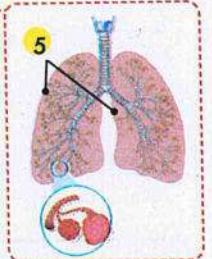
4 Two Bronchi

- They allow air to enter the **two lungs**.
- They are divided into smaller tubes that look like trees' branches, called **bronchioles**.



5 Two Lungs

- They fill up with air like **two balloons**.
- **Inside the two lungs:**
Bronchioles end with tiny air sacs surrounded by blood vessels called **alveoli**.
- **Inside the blood vessels:**
Oxygen moves into the blood, which carries oxygen to all body parts.

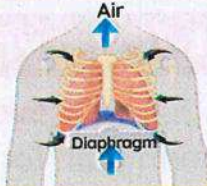


6 Diaphragm

- It's a **large muscle** at the base of the ribs that has an important role during inhalation and exhalation.



Respiration includes:

Inhalation Process "Pulling the air in"	Exhalation Process "Pushing the air out"
	
Diaphragm	
Moves downward (Shrinks or contracts)	Moves up (Relaxes or expands)
Chest Size	
Increases (Enlarges)	Decreases (Becomes narrower)
Type of Air	
Air rich in oxygen gas enters the lungs.	Air rich in carbon dioxide gas is expelled out the lungs.
Pathway of Air	
Nose → Pharynx → Trachea → Lungs	Lungs → Trachea → Pharynx → Nose

Respiration in Humans, Fish and Amphibians

	Humans 	Fish 
Differences	Humans have lungs to inhale oxygen gas from air .	Fish have gills to inhale oxygen gas from water .
Similarities	- Both of them inhale oxygen gas and exhale carbon dioxide gas. - Blood carries oxygen gas to all body parts.	

How do fish breathe?

- Fish have **gills** to breathe underwater.
- Gills are found on both sides of a **fish's head**.
 - Water enters the mouth of a fish and passes across the gills.
 - The blood vessels in the gills carry oxygen gas to the rest of the body and release carbon dioxide gas.



Amphibians

They are small animals that live **in water** and **on land**.

Habitat: Moist environment (rainforests – streams – ponds)

Frogs



Toads



Salamanders



Respiration in Amphibians

On Land

- Adult amphibians inhale oxygen gas from the air through their **lungs** (like humans).

In Water

- They can extract oxygen gas from the water using their **skin**.

Factors that cause extinction of amphibians:

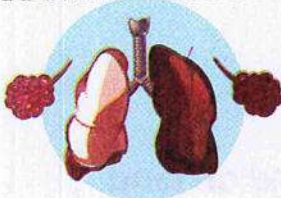
- Air pollution
- Water pollution (Viruses in water)

Human Activities that Change the Environment:

- 1 Cutting down forests
- 2 Plowing grasslands or clearing lands
- 3 Building communities
- 4 Air pollution (cars exhausts and factory pollution)
- 5 Water and soil pollution (dumping waste into waterways or soil)
- 6 Introducing plants and animals to new ecosystems

People living in cities are exposed to a high level of air pollution for long periods of time, so they will suffer from:

Lung damage



Asthma



Heart problems



Living organisms are affected by changes in the ecosystem.

Animals	Some animals can survive by moving to another ecosystem.
Plants	Plants must rely on their seeds landing in a better place for them to survive and grow.
Humans	1 Air pollution (smog) makes it hard for humans to breathe. 2 Water pollution makes it hard for human to find clean water. 3 Soil pollution makes the crops not grow.

The role of humans to help restore the ecosystem:

1
Replanting cleared
forests

2
Removing air and
water pollutants

3
Preserving native
plants and animals

Revision on Concept 1.2

Senses at Work

1 Definitions

Nocturnal animals	They are animals that become active at night to search for food.
Echolocation	It is a property used by dolphins and bats to locate their prey in the dark.
Echo	It is the reflection of sound waves back from a solid surface.
Egyptian mongooses	They are animals that communicate by producing sounds that seem like chatter.
Dolphin	It is a fish that uses the echolocation property to hunt in the dark water.
Owl	It is a bird that has a bowl-shaped face with feathers.
Nervous system	- It is the system that allows us to sense our surrounding environment. - It is the system that keeps the living organisms safe away from danger.
Brain	- It is the main control center in the human body.
Spinal cord	It is a big nerve that passes through the backbone and is connected to the brain.
Nerves	- They are branches extended all over the body parts that carry messages. - They connect the components of the nervous system together.

Sensory receptors	They are nerves found in the sensory organs and receive information from the surrounding environment.
Jerboa	It is a desert rodent that has very large ears and long hind legs.
Reaction time	It is the time taken by a living organism to respond to danger.
Reflex actions	They are messages that are transmitted so fast that you are barely aware of them.
Humpback whales	They are living organisms that sing a wide range of musical tones underwater to communicate.
Ants	They communicate together using their sense of smell.
Nurse ants	They are ants that send smelly messages to scout ants when there is a lack of food.
Scout ants	They are ants that search for food and locate it.
Soldier ants	They are ants that protect the colony from any nearby danger.
A blind person's cane	It is a special device used by a blind person to locate things nearby.
Hearing sense	It is the sense used by bats to detect an echo.
Touch sense	It is the sense used by a blind person to detect an echo.
Smell sense	It is the sense used by ants to communicate.

2 Give a reason for:

- ① Some animals are adapted to be active at night.
 - Because in very hot places, some animals hunt at night when the weather is cooler.
 - Because some prey are available at night only.
 - Because they depend on the darkness to surprise their prey.
- ② The Egyptian mongoose makes sounds.
 - To communicate with other mongooses to move and search for food.
- ③  Owls can hunt during the night.
 - Because they have extraordinary hearing and sight senses.
- ④ Dogs are used in guarding.
 - Because they have sharp hearing and smell senses.
- ⑤ Dolphins can hear different types of sounds.
 - Because they have sharp hearing sense.
- ⑥  Dolphins use the echolocation property that depends on echo.
 - To locate their prey in the dark water.
- ⑦  Owls can rotate (turn) their heads in all directions.
 - To search for the prey everywhere.
- ⑧  Owls have bowl-shaped faces.
 - To direct sound them to the owl's ears.
- ⑨  Owls have large eyes.
 - To see the tiny and far-away movements of the prey.
- ⑩  The brain has an important function in the nervous system.
 - Because it is the main control center of the body that translates messages and gives the muscles the suitable response.
- ⑪ Nerves have an important function in the nervous system.
 - Because they carry messages through the human body.
- ⑫ The Egyptian jerboa can jump for long distances.
 - Because it has long hind legs.
- ⑬ There is hair on the Egyptian jerboa's feet and toes.
 - To help it grip the sand during jumping in zigzag paths.
- ⑭ The Egyptian jerboa has large and sensitive ears.
 - To hear the quiet noise of a snake.

⑮ **Humpback whales sing a range of tones and a series of songs underwater.**

- To communicate with each other in different seasons.

⑯ **The nurse ants send smelly messages to scout ants.**

- To alert the scout ants to search for food.

⑰ **The soldier ants use smells in their communication.**

- To communicate with the other ants if there is danger nearby.

⑱ **Special cane used by blind person changes echo into vibrations.**

- To help the blind person detect his surroundings using his sense of touch.

3 What happens if:

①  **Dolphins have a weak sense of hearing?**

- They cannot detect the echo reflected from their prey, so they will not be able to hunt in the dark water.

② **The sound waves produced by a dolphin hit an object underwater?**

- The sound waves will reflect back to the dolphin in the form of an echo, so the dolphin can detect the location of the object.

③  **Bats have a weak sense of hearing?**

- They cannot detect the echo reflected from their prey.

④ **Owls cannot turn their heads in all directions?**

- They cannot search for their prey everywhere.

⑤  **Your hand touches the spines of a cactus plant?**

- Your hand will move away quickly.

⑥ **The Egyptian jerboa hears a snake moving towards it?**

- It will hop in a zigzag path to escape quickly.

⑦ **The hearing sense of humpback whales becomes weak?**

- They cannot communicate with each other.

⑧ **The smell sense of ants becomes weak?**

- They cannot communicate with each other.

⑨  **The amount of food in the ant's colony becomes low (decreases)?**

- The nurse ants will send a smelly message to the scout ants to alert them.

⑩  **There is danger near the ant's colony?**

- The soldier ants will send smelly messages to alert the other ants.

⑪ **The high-pitched sound that is produced by the blind person's cane hits an object?**

- It reflects back to the cane in the form of an echo.

4 Summary

• Animals have sharper senses than humans to:

- ① Adapt to the environment.
- ② Search for food.
- ③ Protect themselves.
- ④ Communicate together.

Egyptian Mongooses

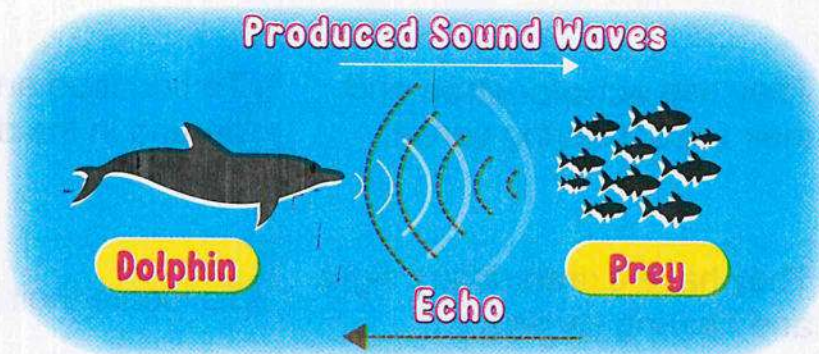
• Egyptian mongooses produce sounds that seem like chatter:

- ① To communicate together.
- ② To move and search for food.



Dolphins

- **Dolphins** use a **property** known as “**echolocation**” that depends on “**echo**” to locate their prey and objects in the dark water.



How does a dolphin locate objects in the dark water?

- ① A dolphin produces **sound waves** which travel in water.
- ② When these sound waves hit a solid object, they return back to the dolphin in the form of an **echo**.
- ③ The echo helps the dolphin locate the prey and other objects.

Nocturnal animals

They are animals that become active at night to search for food.

Why do some animals hunt at night?

- 1 In very hot places, some animals hunt at night when the weather is cooler.
- 2 Some animals depend on darkness to surprise their prey.
- 3 Some prey are available only at night.

Nocturnal Animal	Adaptation	Reason
1 Bats (Mammal) 	They use echolocation and their super hearing sense.	To find food and move around in the dark.
2 Owls (Birds) 	They have extraordinary sight and hearing senses.	To locate their prey.
	They can rotate their heads in all directions.	To search for their prey everywhere.
	They have bowl-shaped faces and feathers on their heads.	To direct sound into the owl's ears.
3 Jerboas (Desert rodents) 	They have large ears.	To help them hear the noise of nearby moving snakes.
	They have long hind legs.	To jump for long distances.
	Their feet and toes have hair.	To grip the sand when they jump in zigzag paths.

Nervous System

- Mammals, such as humans, elephants, and dogs have the **same** nervous system.

Structure of the Nervous system:

1 Brain

Function:

- It is the main control center of the body.

2 Spinal Cord

Function:

- It is a big nerve that runs through the backbone.
- It carries messages from the brain to the body parts and vice versa.

3 Nerves

Function:

- They are distributed throughout the body.
- They connect the sense organs with the brain.
- They carry messages from the brain to the spinal cord and body parts, and vice versa.

Importance of the Nervous system:

1

It gathers information through the sensory organs.

2

It interprets and processes the information.

3

It tells the body what to do.

How does the nervous system work?

- 1 **Sensory receptors** receive information from the environment.
- 2 **Nerves** carry a message from the sensory receptors to the brain.
- 3 **The brain** translates the message and tells the body what to do.

Reaction time

It is the time taken by an organism's body to respond to danger.

What happens if:

A girl touches the spine of a cactus plant?

She will move her hand away quickly.

A jerboa hears the noise of a snake?

It jumps in zigzag paths quickly to escape from the snake.

Reflexes

They are fast messages sent by the nervous system, and we are barely aware of them.

Examples:

- ① Blinking when a strange object gets closer to your eyes.
- ② Moving your hand away when you touch a spine of cactus.

① Humans Communication

- People first started sharing information using **written symbols**.
- Technology systems allow us to **call**, **text**, and send **emails** great distances.

② Ants Communication

- Ants live in **colonies** that contain thousands of individuals.
- Ants use **their sense of smell** to communicate.
- Groups of ants within a colony have **different roles**.



① Nurse Ants

Nurse ants send smelly messages to scout ants when there is a shortage (lack) of food.

② Scout Ants

- Scout ants search for food and locate it.
- Scout ants send a smelly message to alert the other ants where to find food.

③ Soldier Ants

Soldier ants use smelly messages to communicate if there is danger nearby.

3 Humpback Whales Communication

- They sing a wide range of **tones** and a series of **songs** to communicate with each other.
- The songs of humpback whales have **different sound pitches** depending on the **season**.



In Winter

- It is the **mating season**.
- Their songs have **high-pitched** sounds, which travel better in **cold** water.

In Summer

- It is the **feeding season**.
- Their songs have **low-pitched** sounds, which travel better in **warm** water.

NOTES:

- A man has a **rough** voice. (**Low**-pitched sounds)
- A woman has a **sharp** voice. (**High**-pitched sounds)



4 Bats

- Bats also use **sound** to **get information about their surroundings**.

How do bats locate objects in the dark?

- 1 A bat makes a high-pitched sound.
- 2 When the sound hits an insect, it reflects back in the form of an echo.
- 3 The bat listens for the echo and locates the insect nearby.



How does a blind person use the cane?

- 1 The special cane emits a high-pitched sound.
 - 2 When the sound hits an object, it reflects as an echo.
 - 3 **The special cane changes the echo into vibrations.** 
- To allow the blind person to detect the echo using their **thumb (touch sense)**, so they can know the directions of objects (obstacles) around them.



Revision on Concept 1.3

Light and Sight

1 Definitions

Light	It is the visible form of energy that travels in the form of waves.
Light source	It is the object that emits its own light.
Sun	It is the natural source of light.
Moon	It is the shiny object in the sky that reflects the sunlight falling on it.
Eye	It is the organ that is affected by light and is responsible for sight.
Night vision goggles	It is a tool used by humans to see objects through the dark.
Eye pupil	It controls the amount of light that enters the eye.
Fishing cat	It is a wild cat that has eyes glow at night.
Transparent materials	They are materials that allow light to pass through them.
Opaque materials	They are materials that don't allow light to pass through them.
Smooth materials	They are materials that reflect the light rays in one direction.
Rough materials	They are materials that diffuse the light rays in different directions.
Light reflection	It is the bouncing of light rays when it falls on a reflecting surface.
Shadow	It is a dark area that is formed when light falls on an opaque object.

Fireflies	They are a kind of beetles that light up their wings to communicate.
Code	It is a pattern that has a meaning.
Language	It is a code in the form of sounds.
Writing	It is a code in the form of symbols or arranged letters.

2 Give a reason for:

- ①  **The fishing cat's eyes seem to glow in the dark.**
 - Because it has a mirror-like membrane on the back of its eyes which reflects the light rays that fall on it.
- ②  **A candle is considered a source of light.**
 - Because it emits its own light.
- ③  **The moon seems shiny, but it is not considered a source of light.**
 - Because the moon reflects the sunlight falling on it.
- ④ **Nocturnal animals can see better than humans at night.**
 - Because nocturnal animals have bigger eyes and their pupils open wider than humans.
- ⑤  **The shadow of an opaque body is formed when light falls on it.**
 - Because the opaque body does not allow light to pass through it.
- ⑥ **You can see an object placed behind a glass window.**
 - Because glass is a transparent material that allows light to pass through.
- ⑦  **Fireflies use different patterns of flashlight to communicate with each other.**
 - To warn off predators or to attract a mate.
- ⑧ **Fireflies produce a chemical reaction inside their bodies.**
 - To light up their bodies and communicate with each other.

3 What happens if:

- ①  **The fishing cats' eyes doesn't have a mirror-like membrane?**
 - Fishing cats will not see well at night.

- ② **The moon cannot reflect light?**
- It becomes dark and we cannot see it at night.
- ③  **Light falls on a transparent object, such as a glass window?**
- Light will pass through the glass window.
- ④  **Light falls on an opaque object, such as a human body?**
- Light will not pass through it and a shadow will be formed.
- ⑤  **Light falls on a smooth surface (a mirror)?**
- Light rays are reflected in the same direction.
- ⑥  **Light falls on a rough surface (wood)?**
- Light rays are diffused in different directions.
- ⑦ **A firefly wants to attract a mate?**
- It produces a chemical reaction inside its body to light up.
- ⑧ **Another group of fireflies flashes nearby?**
- They will stop flashing their own pattern and start to match the pattern of the other fireflies.
- ⑨ **The traffic light becomes red while you are driving the car?**
- The eyes send a message to the brain, then the brain alerts you to stop moving.

4 Summary

- The visibility of objects depends on the amount of light, where:

In a bright place

Humans can see objects **clearly**.

In a dim light place

Humans sees objects **less clearly** and still needs more light.

In the dark

Humans **can't see** anything, so humans depends on other senses, such as touch.

- Humans can use **night vision goggles** to see in the dark.
- Humans need a source of light to see clearly.



Source of Light

It's something that emits (gives off) its own light.

Examples of Light Sources:

The Sun



Electric Lamp



Fire



Flashlight



Candle



- The moon and mirror are not considered sources of light.** 

Because they don't emit (produce) their own light, where:

The moon reflects the sunlight falling on it.

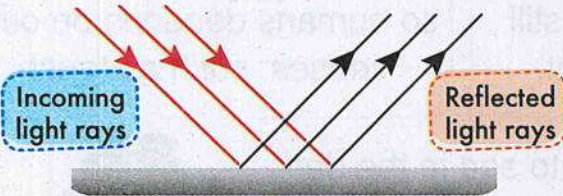
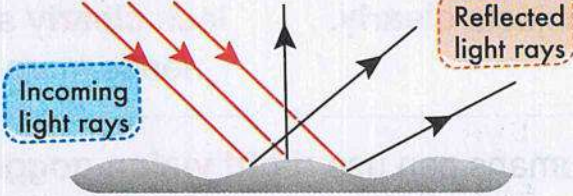


The mirror reflects any light falling on it.



Light Reflection

The light reflection depends on the smoothness of the surface.

Smooth Surface such as a polished mirror	Rough Surface such as a painted surface
	
What happens if:	
• Light falls on a smooth surface? – Light rays would be reflected in one direction with the same angle at which they hit the surface.	• Light falls on a rough surface? – Light rays would be scattered (diffused) in different directions.

Light is a visible form of energy that travels in a **straight line** in the form of **waves**.

Objects are classified into:

Transparent Objects	Opaque Objects
	
• They are the objects that allow light to pass through. • Things can be seen through them. • They don't cast shadows.	• They are the objects that don't allow light to pass through. • Things can't be seen through them. • They cast shadows.
Examples:	
Air – Water – Glass – Lenses – Window	Human body – Wood – Metals

Shadow happens when light falls on an opaque object.



Nocturnal Animals

- Nocturnal animals can see **better than** humans in dim light.

	Human	Nocturnal animal
		
	Pupil	Pupil
Eye Size	Smaller eyes	Bigger eyes
Eye Pupil	Opens narrower	Opens wider

Fishing Cat

- The fishing cat's eyes seem to glow in the dark. **GR**
 - Because it has a **mirror-like membrane** (structural adaptation) at the back of its eyes.
 - This membrane reflects any light entering its eyes.



Codes

- Humans use codes to communicate and transmit information.

Code

It is a pattern that has a meaning.

1 Thumbs-up or Thumbs-down



Thumbs-up means good.



Thumbs-down means bad.

2 Facial Expressions

They are codes that help people predict what we **feel** or **think**.

3 Language

- Language is a code in the form of **sounds** that transfer information.
- Different languages have different codes.

4 Writing

It is a code in the form of **symbols** or **arranged letters** that have a specific meaning.

5 Traffic Lights



Red means "Stop".



Green means "Go".

6 Lighthouses

They encode information in flashes of **light** to tell sailors where they are.

7 Music or Sounds

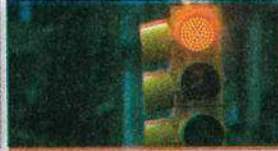
Many musical instruments can be used to transfer information in the form of a code.

Examples of Information that the Eyes Receive:

1 You see your friend waving.



2 A car stops when it sees a red traffic light.



3 Using a rescue flare to get help.



4 Hikers use mirrors that flash to attract the attention of rescue helicopter pilots.



NOTE:

- In the past, humans used **signal fires** to communicate from a distance of many kilometers.
- The brain **decodes** and **interprets** the meaning of the code.

Fireflies

- They live on **mangrove trees** in Thailand.
- They are a type of insect called **winged beetles (not flies)**.
- Fireflies produce a **chemical reaction** inside their bodies that allows them to **light up** to communicate together.
- Fireflies depend on their sense of **sight** to communicate together.



- Fireflies use their wings to make different flash patterns in regular periods of time.
 - To warn other fireflies of predators.
 - To attract a mate to reproduce.



Revision on Concept 2.1

Starting and Stopping

1 Definitions

Static object	It is the object that doesn't change its position.
Moving object	It is the object that changes its position.
Shockwave truck	It is the fastest truck in the world.
Force	It is a push or a pull that is applied on an object to move it.
Pushing force	It is the force you can do to move an object away from you.
Pulling force	It is the force you can do to move an object toward you.
Motion	It is the change of the position of an object relative to a fixed starting point.
Gravity	It is the force that pulls objects down toward the Earth.
Friction	It is the force that arises when two objects rub against each other.
Energy	It is the ability to do work.
Work	It is a force that causes an object to move a distance.

2 Importance

Jet engines in Shockwave truck	They make the Shockwave truck reach speeds more than 500 kilometers per hour.
---------------------------------------	---

Parachutes in shock wave truck	They help the driver to slow down the Shockwave quickly.
Friction	It slows down or stop the moving objects.

3 Give a reason for:

- ① A jet airplane is faster than a normal truck.
 - Because a jet airplane has a more powerful engine than a normal truck.
- ② The Shockwave truck is faster than a normal truck.
 - Because it has three jet engines.
- ③ Engineers use three parachutes in the Shockwave truck designs.
 - To help the driver decrease the speed of the Shockwave truck quickly.
- ④ By increasing the number of fire extinguishers, the cart moves a longer distance.
 - Because by increasing the number of fire extinguishers, the speed of the cart will increase.
- ⑤  The static ball on the ground moves when you kick it.
 - Due to the pushing force of your leg on it.
- ⑥ When two equal pushing forces act on an object in opposite directions, the object does not move.
 - Because the forces that affect the object are balanced, so the object doesn't move.
- ⑦  When you throw a ball up, it returns to the ground.
 - Due to the gravity that pulls the ball down towards the Earth.
- ⑧  When a car crashes into a wall, it will stop moving.
 - Because the wall applied a force to the car that is equal to the force of the moving car but in the opposite direction.
- ⑨ When you stop pedaling during the movement of your bicycle, it slows down until it stops.
 - Due to the friction force between the bicycle tires and the road.

4 What happens if:

- ① You kick a static ball on the ground?
 - The ball will move due to the pushing force of your leg.
- ② The driver of Shockwave truck opens the parachutes?
 - The Shockwave truck slow down gradually until it stops.
- ③  The pulling force of the two teams are equal in the tug-of-war game?
 - The rope will not move.
- ④  The pulling force of the two teams are unbalanced in the tug-of-war game?
 - The rope will move towards the greater force.
- ⑤  You let your book out of your hand?
 - The book will fall down due to the pulling force of gravity.
- ⑥ A car run out of fuel on the flat road?
 - The speed of the car decreases gradually until it stops.
- ⑦ A car and a truck are affected by the same pushing force?
 - The car travels a longer distance than truck.
- ⑧ You push two similar toy cars with different forces?
 - The toy car that is pushed with greater force moves a longer distance than the other toy car.

5 Summary

First

Motion



- An object stays **static** when it doesn't change its position because there is **no force** acting on it.



- An object **moves** when it changes its position because there is a proper **force** acting on it.

Motion

It is the change in an object's position relative to a fixed point.

To move any static object:

1

A pushing or pulling force must act on it.

2

A change in the position happens as time passes.

Some motions are:

easy to see, such as:

A person waling down the street

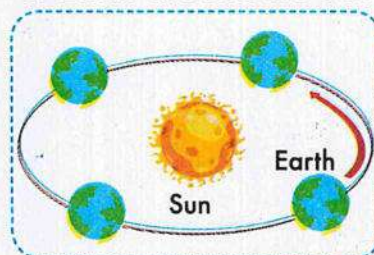


The movement of leaves by the blowing wind



hard to see, such as:

The revolution (movement) of Earth around the sun



Second Force

Force

It is a **push** or a **pull** applied on an object to change its position.

A force can:

1 Move a static object.



2 Stop a moving object.



3 Change an object's speed.



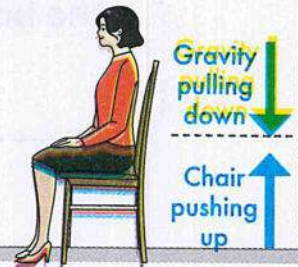
4 Change an object's direction.



The direction of force is determined by the total force applied on the object.

- When you are sitting on a chair, there is no motion. **GR** Because there are two **balanced forces** acting on you, which are:

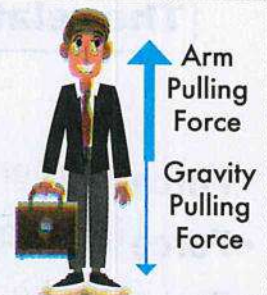
- 1 The **pulling** force of gravity **downward**.
- 2 The **pushing** force of the chair **upward**.



- When you lift a bag, there are two **unbalanced forces** acting on the bag in opposite directions, which are:

- 1 The **pulling** force of your arm **upward**.
- 2 The **pulling** force of gravity **downward**.

So, the bag moves **upward** towards the greater force.



Gravity

It is the force that pulls the objects downward.

The Effect of Force on Motion

- **By increasing the acting force on an object:**
 - It moves a longer distance.
 - Its speed increases, and its kinetic energy increases.
- **By applying the same force on different objects:**
 - The **small car** moves a **long** distance.
 - The **big truck** moves a **short** distance.



The boy who pushes the wall doesn't do any work.
Because the wall doesn't move.



The relationship between energy, work, and force:

- **Force** transfers **energy** from one object to another.
- **Force** is something that changes **energy** so that it can do **work**.
- **Energy** is the ability to do work.
- **Work** is the energy transferred by a force to move an object.

Third Force Types

1 Pulling and pushing forces

Pulling Force

It is a force that you can do to move an object toward you.



Pushing Force

It is a force that you can do to move an object away from you.



2 Balanced and unbalanced forces

In a tug-of-war game, two teams **pull** the rope in **opposite** directions.

Balanced Forces

The rope doesn't move.

- When the forces acting on the rope are **balanced**.



Unbalanced Forces

The rope moves towards the greater force.

- When the forces acting on the rope are **unbalanced**.



3 Wind force

Air force (wind blowing) can move some objects, such as the **tree leaves**.

How did engineers prove that air causes movement?



- Engineers fixed a fire extinguisher onto a static cart.
- When air is released **backward** from the extinguisher, the cart begins to move **forward**.
- By **increasing** the number of fire extinguishers, the speed of the cart **increases**, and it covers a **longer** distance.

Fourth Moving Objects



Shockwave
(World fastest truck)



- A jet engine is much faster than a truck because the jet's engine is much more powerful than the truck's engine.

- It has **three** jet engines.
- Its speed can reach **500** kilometers per hour.
- It is **five times** faster than a normal truck.

How does it move?

It moves by the **pushing** force of its powerful jet engines.

How does it stop? (As a rocket design)

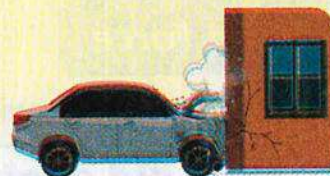
It has **three parachutes** that help the driver to slow down it quickly.

Fifth Stopping Objects

A moving object stops when a force acts on it with the **same amount**, but in the **opposite direction**.

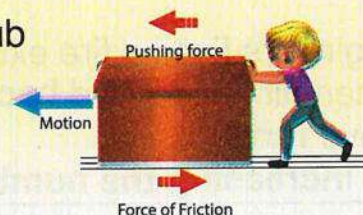
Collision

- When a moving car crashes into a wall, it stops.
- Because the wall applied force to the car in the **same amount** and in the **opposite direction**.



Friction Force

- It is the force that arises when two surfaces rub against each other.
- It acts in the **opposite** direction of the motion.
- It always **slows down** or **stops** the moving object.



Revision on Concept 2.2

Energy and Motion

1 Definitions

Potential energy	It is the energy stored in an object due to its position.
Kinetic energy	It is the energy gained by an object due to its motion.
Chemical energy	It is the energy stored in the food we eat.

2 Importance

Electric motors in roller coaster	They help carry the cars of roller coaster up to the top of the hill.
Thermal energy	It helps us in cooking food.
Light energy	It helps us light houses and streets.
Electrical energy	It helps us operate all electric devices.

3 Give a reason for:

- ①  The roller coaster doesn't need electricity during sliding down.
 - Because the stored potential energy changes to kinetic energy.
- ② The goal net vibrates when a ball hits it.
 - Because the kinetic energy of the ball transfers to the goal net.
- ③  The book on the table has energy.
 - Because the book on the table stores potential energy.
- ④  When a ball is thrown upwards, its potential energy increases.
 - Because its height from the Earth increases.

⑤ An electric lamp produces different forms of energy.

- Because it produces light and thermal energies.

⑥ On lifting the toy car operated by a spring, the car moves.

- Because the potential energy stored in the spring changes to kinetic energy.

4 What happens if:

①  A roller coaster moves up the ramp?

- The stored potential energy increases.

② The speed of the roller coaster increases during sliding down?

- Because its kinetic energy increases.

③ Food is very important for humans?

- Because burning of food in the human body produce kinetic energy that help human to move and carry out different activities.

④  A roller coaster moves down the ramp? (According to the change in energy)

- Its stored potential energy changes into kinetic energy.

⑤  An apple falls from a tree to the ground? (According to the change in energy)

- The potential energy of the apple changes into kinetic energy.

⑥  You transfer a book from a lower shelf to a higher shelf?
(According to the potential energy)

- The stored potential energy increases.

⑦  You operate a washing machine? (According to the change in energy)

- The electrical energy changes into kinetic and sound energies.

⑧  You switch on an electric lamp? (According to the change in energy)

- The electrical energy changes into light and thermal energies.

5 Summary

Energy Basics

Energy

It is the ability to do work.

Force

It is the effect that changes **energy** into **work** done.

Work

It is the force that causes an object to move.

Relationship Between Energy and Work

- The boy needs **energy** to move the box.
- The boy exerts a **pushing force** on the box.
- When the box moves, there is **work** done.



Importance of Energy for Us

1

The food we eat stores **chemical energy**.



2

Thermal energy is used for cooking food or heating water.



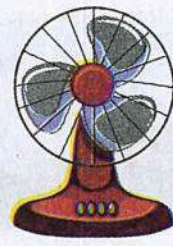
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Light energy is used for lighting houses and streets.

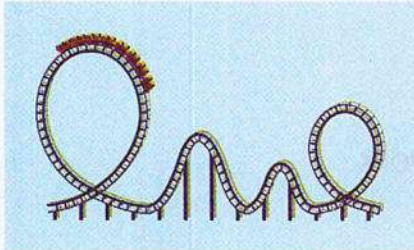


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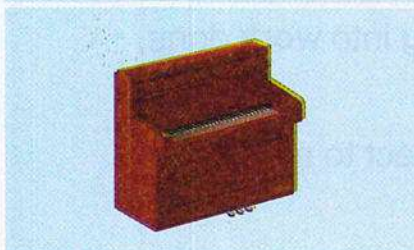
Electrical energy is used in operating electric devices.



Properties of Energy



- 1 Energy can be **stored** and changed from one form to another, such as in roller coasters.



- 2 Most forms of energy **can't be seen**, such as sound, thermal, chemical and electrical energies.



- 3 The work done by energy can be seen and measured, such as when the goal net vibrates when it gains kinetic energy.

Moving Energy

» Energy can transfer from one object to another.

Example: When a football player kicks the ball:

1

The ball on the ground has **no** energy.



2

When the player kicks the ball, kinetic energy transfers from the **player's foot** to the **ball**, so the ball moves in the air.



3

Kinetic energy transfers from the **ball** to the **goal net**, which vibrates.



Roller Coaster

At the beginning	• Electricity and motors carry the cars up to the top of the ramp.
During moving upward	 • The stored potential energy increases gradually.
At the highest point (On the ramp)	 • The stored potential energy becomes maximum.
During sliding down	 • The stored potential energy is converted into kinetic energy. • As we move down, the speed and kinetic energy increase.



Scientists Classify Energy Into Two Types

Potential Energy

- It is the energy stored in an object due to its **position**.

Example:

When you raise the ball from the ground, it stores potential energy.



Kinetic Energy

- It is the energy that an object has due to its **motion**.

When you leave the ball to fall, it gains kinetic energy.

Potential energy depends on:

- 1 The **height** of the body.
- 2 The **mass** of the body.

Kinetic energy depends on:

- 1 The **speed** of the body.
- 2 The **mass** of the body.

A static object at a height stores **potential** energy.



A moving object has **kinetic** energy.



A static object on the ground has no energy.



All forms of energy are classified into potential or kinetic energies.

1 Forms of Kinetic Energy:

1 Sound Energy	2 Light Energy	3 Electrical Energy	4 Heat Energy
			
The movement of sound waves in the air	The movement of light waves in the air	The movement of electricity through wires	The vibration of water particles during heating

2 Forms of Potential Energy

1 Gravitational Potential Energy	2 Chemical Potential Energy
	
A ball at the top of a hill stores gravitational potential energy.	- A battery stores chemical potential energy. - The chemical energy stored in a battery isn't used until the battery is connected to any device.



NOTE:

A compressed spring stores **potential energy** in it.

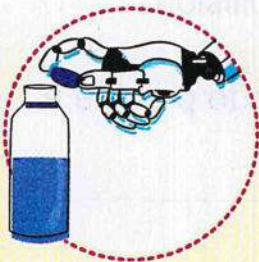


Energy Transformations

- Potential energy can be easily converted into kinetic energy.

Device	Energy Used	Energy Produced
Flashlight 	Chemical energy (Stored in a battery)	Light energy Thermal energy
Gas oven 	Chemical energy (Stored in natural gas)	Thermal energy
Spring-powered toy car 	Potential energy (Stored in the spring wire)	Kinetic energy
Real car 	Chemical energy (Stored in gasoline)	Kinetic energy Sound energy Thermal energy

Example: Robot hand



Function

Opening the jar cap that is hard to be opened.

Source of Energy

The robot is powered by batteries.

Energy Transformation

The **Chemical** energy stored in batteries is changed into **Electrical** energy in the robot's hand is changed into **Kinetic (mechanical)** energy when the robot's hand moves to open the bottle.

Revision on Concept 2.3

Energy and Collisions

1 Definitions

Collision	It is the crashing of two objects into each other.
Cricket	It is a popular game in which a player hits the ball with a wooden bat.
Speed	It is the distance traveled in a certain amount of time.

2 Importance

Wrecking ball	It is used to knock down buildings.
Seatbelt	It keeps the driver's body from moving forward during a collision.
Airbag	- It slows the speed of the driver from moving forward. - It absorbs the energy of the car during a collision.
Sensors	They tell the airbag to inflate and fill with gas to provide a soft cushion.

3 Give a reason for:

- ① The speed of the ball increases when the bat hits it hard.
 - Because the kinetic energy of the bat transfers to the ball.
- ②  Seatbelts in cars are very important.
 - Because they keep the driver's body from moving forward when the car stops suddenly.

- ③  Airbags in cars are very important.
- Because they slow down the speed of the driver moving forward and absorb the energy of the car during a collision.
- ④ When two objects collide, you can hear a sound.
- Because a part of the kinetic energy changes into sound energy.
- ⑤ Driving fast is very dangerous.
- Because when the speed of the car increases, its kinetic energy increases that results in exerting more force during a collision.
- ⑥ A truck needs a bigger engine than that of a small car to move.
- Because a truck has more mass than a car.
- ⑦  A truck consumes more fuel than that consumed by a small car.
- Because the truck has a bigger engine than the car.
- ⑧ A moving truck has more kinetic energy than a small moving car at the same speed.
- Because the truck has a greater mass than the small car.
- ⑨ The amount of energy before collision is equals to the amount of energy after collision.
- Because the energy is conserved, so it cannot be destroyed.

4 What happens if:

- ① A moving bat hits a ball in cricket?
- The kinetic energy of the bat transfers to the ball.
- ② The airbags in a car don't inflate during a crash?
- The driver will be pushed forward and get injured.
- ③  The speed of a car increases? (According to the kinetic energy)
- The kinetic energy increases.
- ④ Two cars moving in opposite directions collide?
- The damage will be more severe.
- ⑤ Two cars moving in the same direction collide?
- The damage will be less severe.
- ⑥ A bike moving fast hits a person?
- The person may get injured only and survive.

- ⑦ A car moving fast hits a person?
 - The person's life may be in danger.
- ⑧ The pushing force acting on an object increases? (According to the kinetic energy)
 - The kinetic energy will increase.
- ⑨ The kinetic energy of a moving car increases? (According to the damage of the collision)
 - The damage will be more severe.
- ⑩ You increase the angle of inclination of a ramp where a ball is moving down? (According to the speed of the ball)
 - The speed of the ball will increase.
- ⑪  Newton's cradle ball is raised up without leaving it? (According to its energy)
 - The ball stores potential energy.
- ⑫  You let the ball of Newton's cradle move towards the rest of the balls? (According to the change of energy)
 - The potential energy changes into kinetic energy.

5 Summary

Collision

It is the crashing of two objects into each other.

When two cars collide with each other:

Energy **transfers** between them.

Energy **changes** from a form to another.

Factors affecting collision

1 The speed of the two cars

Fast-Moving Objects

Slow-Moving Objects

Energy

- They have **more** energy.

- They have **less** energy.

During a Collision

- They exert **more force**, which causes a **big damage** that cannot be repaired.



- They exert **less force**, which causes **less damage** that can be repaired.



2 The direction of the two cars

When two cars are moving at different speeds and in **the same** direction:

- The damage will be **less** severe as they exert a small force during the collision.



When two cars are moving at different speeds and in **the opposite** directions:

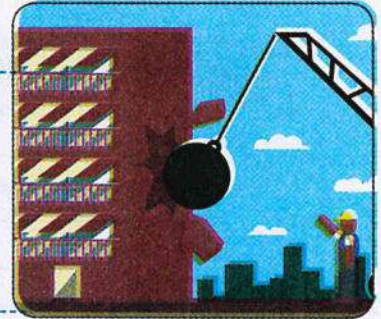
- The damage will be **more** severe as they exert a great force during the collision.



Examples for Collision:

Wrecking ball

- It is a very heavy steel ball swinging on a cable.
- It is used by construction workers to knock down walls or parts of buildings.



Cricket

- The player uses a **wooden bat** to hit the ball.

When the player hits the ball:

- Kinetic energy transfers from the **bat** to the **ball**.
- The speed of the ball **increases**.
- The ball returns in a **different direction**.
- A collision always produces a **popping sound**.



Newton's Cradle

When the ball is raised up:

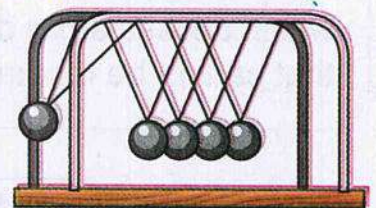
- The ball stores **potential energy** and doesn't contain any kinetic energy.

When you leave the ball:

- Potential energy decreases gradually and is converted into **kinetic energy**.

When the ball hits the 1st other ball:

- Kinetic energy transfers from the 1st ball to the rest of the balls.
- Some of the kinetic energy is converted into **sound and thermal energies**.



If a truck (more mass) hits a car (less mass):

- Energy will transfer from the truck (more mass) to the car (less mass).
Because the truck has **more energy** than the car.
- The truck (heavy object) causes more damage than the car (light object).

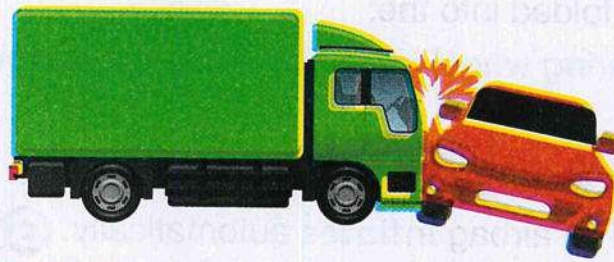
The truck:

Has a big mass.
Has a big engine.
Consumes more fuel.
Has more kinetic energy.

Causes more
damage than

The car:

Has a small mass.
Has a small engine.
Consumes less fuel.
Has less kinetic energy.



If a fast car (higher speed) hits a slow car (lower speed):

- Energy will transfer from the fast car (higher speed) to the slow car (lower speed).
Because the fast car has **more energy** than the slow car.
- Fast objects cause more damage than slow objects.

A fast car:

Has high energy.

Causes more
damage than

A slow car:

Has low energy.



Safety Equipment During Collision

1 Seatbelt

- It is used in cars to keep the driver and the passengers from moving **forward** during a collision (when the car stops suddenly).



2 Airbag

Material • It is made of a **thin nylon material**.

Location • It is folded into the:
steering wheel, dashboard, seats, or doors.



Idea

a During collision:

- The airbag **inflates** automatically. **GR**
Because the sensors in the car detect a crash.

Function of the sensors

They tell the airbag to inflate and fill it with gas to provide a soft cushion.

b After collision:

- The airbag **deflates** as fast as it inflates. **GR**
Because it has holes or vents that allow the gas to come out of the airbag so that the driver can get out of the car.

Importance

- It slows the speed of the driver's motion forward.
- It absorbs the energy of the car's impact during a collision.

Speed

- Speed is the distance covered by a moving object in a unit of time.
- Speed is a physical measurement that indicates how fast objects move.
- The direction of the moving object doesn't affect the speed.

How to Measure the Speed

1 You must know the distance covered by the object.	Meter or kilometer
2 You must know the time taken to cover this distance.	Second or hour
3 To find the speed: Speed = Distance ÷ Time	m/sec or km/hr

Problem:

- If Kenzy rides a bike and covers **150 m** in **15 seconds** to reach the supermarket, calculate the speed of the bike.

» Speed = $\frac{\text{Distance}}{\text{Time}} = \frac{\dots\dots\dots}{\dots\dots\dots} = \dots\dots\dots \text{ m/sec.}$



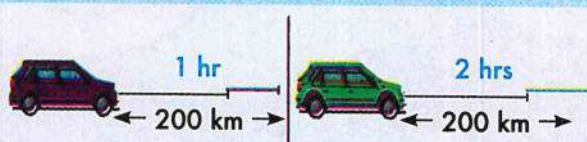
Comparing the Speed of One Body to Another

- 1 The relationship between speed and distance (At the same time)



The red car moves at a **higher speed** because it covers a **longer distance** in the same amount of time.

- 2 The relationship between speed and time (At the same distance)



The purple car moves at a **higher speed** because it covers **the same distance** in **shorter time**.

Assessments and Model Exams



Concept 1.1

Lesson 1

Self-Assessment 1

15

1 (A) Choose the correct answer:

1. A rabbit could survive in a polar habitat if it had and fur.
(a) thin _ white (b) thick _ brown (c) thick _ white (d) thin _ brown
2. The penguin's feet have blood vessels that bring up to its body.
(a) warm blood (b) cold water (c) warm water (d) cold blood

(B) Write the scientific term:

1. They are the characteristics that help living organisms survive and reproduce in their ecosystems. (.....)
2. It is a property that helps a living organism blend in with the surrounding environment. (.....)
3. It is the animal that is eaten by another animal. (.....)

2 (A) Put (✓) or (x):

1. The agama lizard blends in with the green leaves to hide from its enemies. ()
2. Antarctica has the coldest climate on Earth. ()
3. The thick white fur is an adaptation in bears that live in Polar Regions. ()

(B) Mention the two adaptations that keep the penguin's body warm.

1.
2.

3 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Brown bear	(a) has a sandy-colored fur to blend in with the desert landscape.
2. Polar bear	(b) has a white fur to sneak up on its prey.
3. Fennec fox	(c) has a dark fur to hide among forest trees to hunt its prey.

1.
2.
3.

(B) What happens if:

1. The body of the polar bear is covered with brown fur?
.....

2. Animals can't adapt to their environment?
.....

Concept 1.1

Lesson 2

Self-Assessment 2

15

1 (A) Put (✓) or (X):

1. Starred agama lizard and panther chameleon are from reptiles. ()
2. Palm tree has a thick trunk and narrow leaves. ()
3. Panting in fennec fox belongs to structural adaptation. ()

(B) Give a reason for:

1. Panther chameleon has V-shaped feet and a long tail.
.....

2. Barbary fig has sharp spines.
.....

2 (A) Choose the correct answer:

1. Bull sharks have less competition on food in
 (a) salt water only (b) seas only (c) rivers (d) oceans and seas
2. Both and have sharp spines to keep animals away.
 (a) acacia trees – kapok trees (b) kapok trees – barbary figs
 (c) barbary figs – acacia trees (d) water lilies – mangrove trees

(B) What happens if:

1. Pine tree has an umbrella shape?
.....
2. Panther chameleon is exposed to danger?
.....

3 (A) Cross out the odd word:

1. Palm tree – Pine tree – Fennec fox – Caracal (.....)
2. Taproot – Tiny leaves – Buttress root – Spines (.....)

(B) Observe the following figures, and then complete the sentences below:

1. The tree in figure (1) has to resist waves, which is considered as a adaptation.
2. The fur of the fox in figure (2) turns into color when ice melts.



Figure (1)



Figure (2)

1 (A) Choose the correct answer:

- The digestion process starts in
 (a) esophagus (b) mouth (c) stomach (d) small intestine
- In lungs, are tiny air sacs at the end of the bronchioles.
 (a) trachea (b) blood vessels (c) bronchi (d) alveoli

(B) Write the scientific term:

- It is the process of breaking down food into small pieces to let the body cells get nutrients from them. (.....)
- It is a muscle that contracts during inhalation and expands during exhalation. (.....)
- It is a harmful gas produced in respiration process. (.....)

2 (A) Put (✓) or (X):

- Pharynx is a common organ between digestive system and respiratory system. ()
- Liver and pancreas pour their juices into the stomach. ()
- Trachea is a tube through which air travels down into lungs. ()

(B) Give a reason for:

- The inhaled air differs from the exhaled air.

(C) Mention the function of saliva in the digestion process.

3 (A) Cross out the odd word:

- Stomach – Trachea – Small intestine – Esophagus (.....)
- Saliva – Teeth – Tongue – Large intestine (.....)

(B) The organ in the opposite figure is called , and it absorbs from the undigested food.



(C) What happens if:

- The diaphragm moves downward during inhalation?

Concept 1.1

Lesson 4

Self-Assessment 4

15

1 (A) Put (✓) or (x):

1. Water pollution affects fish, humans and plants. ()
2. Air enters the mouth of a fish then it passes through its gills. ()
3. Both humans and fish breathe in oxygen gas from water. ()

(B) Write the scientific term:

1. They are structures that allow fish to breathe under water. (.....)
2. It is a kind of pollution caused by the exhausts from cars and factories. (.....)

2 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Oxygen gas	(a) is caused by air pollution.
2. Asthma	(b) fish and human bodies get rid of it during exhalation process.
3. Carbon dioxide	(c) is very important for breathing process.

1. 2. 3.

(B) Give a reason for:

1. Gills are very important organ for fish.
.....

2. People live in big cities suffer from asthma and lung damage.
.....

3 (A) Choose the correct answer:

1. Humans can help in restoring the ecosystem by
(a) plowing grasslands (b) replanting cleared forests
(c) cutting down trees (d) throwing waste in water
2. Both humans and fish to survive.
(a) need clean water to breathe (b) inhale oxygen gas
(c) inhale carbon dioxide gas (d) exhale oxygen gas

(B) Complete the following sentences:

1. Gills are considered as a adaptation that allows to breathe under water.
2. of lungs and gills carry oxygen gas to all the body parts.

1 (A) Choose the correct answer:

- Both and live in wetland habitats.
 - (a) a frog – a palm tree
 - (b) a fennec fox – a frog
 - (c) water lily – a frog
 - (d) an arctic fox – a salamander

(B) What happens if:

1. Frogs have lungs only to respire?

.....

2. The skin of a salamander becomes dry?

.....

2 (A) Put (✓) or (x):

1. Both bull shark and salamander can respire through their lungs. ()
2. Frogs, toads and salamanders belong to reptiles. ()
3. Panther chameleons and toads can be found in rainforests. ()

(B) Write the scientific term:

1. They are species of living organisms that can live on land and in water. (.....)
2. It is the structure that allows amphibians to extract oxygen gas from water. (.....)

3 (A) Complete the following sentences using the words below:

(moist – gills – lungs)

1. Amphibians and humans have for respiration.
2. Amphibians live in environments.
3. Fish can respire through

(B) Give a reason for:

1. Amphibians need clean air and water to survive.

.....

2. Amphibians can't survive in a grassland habitat.

.....

Concept 1.2

Lesson 1

Self-Assessment 6

15

1 (A) Put (✓) or (X):

- Owls have extraordinary senses of taste and sight. ()
- Foxes have sharp sense of hearing to avoid danger. ()
- Egyptian mongooses make sounds to communicate with each other. ()

(B) Give a reason for:

- Dolphins can hear all types of sound.

- Dogs are used in guarding.

2 (A) Choose the correct answer:

- We can distinguish between sugar and salt using sense.
 (a) smell (b) hearing (c) sight (d) taste
- Both dogs and dolphins have sharp senses of
 (a) sight (b) smell (c) touch (d) hearing

(B) What happens if:

- Dolphins have a weak sense of hearing?
- The sound waves produced by a dolphin hit a fish under water?

3 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Echo	(a) is the organ used to identify the odor of a flower.
2. Nose	(b) is bouncing back of sound waves when they hit a solid object.
3. skin	(c) is the organ used to recognize smooth and rough surfaces.

1. 2. 3.

(B) Look at the following figures, then answer the following questions:

- Mention the sharpest senses in animal (1).
- Does the animal (2) can detect the scent of near preys? And why?



Animal (1)



Animal (2)

1 (A) Choose the correct answer:

- have the ability to turn their heads in all directions.
 (a) Snakes (b) Jerboas (c) Dolphins (d) Owls
- When your hand touches the spines of a cactus plant, it is withdrawn in second(s).
 (a) one (b) two (c) less than one (d) ten

(B) Write the scientific term:

- They are the animals that become active at night. (.....)
- It is the time taken by an organism's body to respond to danger. (.....)
- It is a mammal that has super hearing sense. (.....)

2 (A) Put (✓) or (x):

- The Egyptian jerboa is a rodent, while a bat is a bird. ()
- The skin is an important organ of the digestive system. ()
- The nose contains sensory receptors that receive the odor of food. ()

(B) Look at the following figures, and then complete the following sentences:

- Mention one behavioral adaption that animal (1) uses to escape from danger.
- How does the shape of the face of animal (2) look like? And why?



Figure (1)



Figure (2)

3 (A) Choose from column (A) what suits in column (B):

Column (A)	Column (B)
1. Spinal cord	(a) carry the message from your eyes to your brain when you see something.
2. Nerves	(b) is the main control center of the human body.
3. Brain	(c) is a big nerve that runs through the backbone.

1. 2. 3.

(B) What happens if:

- Your hand touches the thorns of a cactus plant?

- Bats cannot use the echolocation property?

Concept 1.2

Lesson 3

Self-Assessment 8

15

1 (A) Put (✓) or (X):

1. The sensory receptors in your skin sense the coldness of the weather. ()
2. Spinal cord processes sound waves coming from your ears through nerves. ()
3. Muscles connect all parts of the nervous system. ()

(B) Write the scientific term:

1. They are the organs that receive information from the surrounding environment. (.....)
2. They are messages sent by the nervous system that are often so fast that you cannot recognize. (.....)

2 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Eye	Ⓐ helps you to recognize the sour taste of lemon.
2. Tongue	Ⓑ helps you to identify the color of milk.
3. A reflex	Ⓒ occurs when something comes near your eyes.

1. 2. 3.

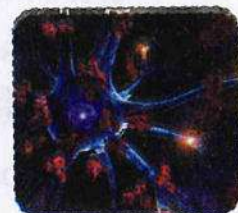
(B) What happens if:

- Your foot touches a nail on the ground?

.....

(C) Complete the following sentence:

- The opposite figure represents that belong to the system.



3 (A) Cross out the odd word:

1. Hearing – Touching – Nose – Sight (.....)
2. Skin – Tongue – Eye – Sight (.....)
3. Lungs – Brain – Spinal cord – Nerves (.....)

(B) Mention one function of each of the following:

1. Brain.
.....
2. Nervous system.
.....

1 (A) Choose the correct answer:

- Sense organs collect information and send signals to for processing and understanding.
 (a) stomach (b) brain (c) legs (d) hands
- use echolocation by bouncing high-pitched sounds in the air.
 (a) Owls (b) Whales (c) Dolphins (d) Bats
- is the system that controls all the body functions.
 (a) Digestive system (b) Respiratory system
 (c) Nervous system (d) Reproductive system

(B) Write the scientific term:

- It is a group of ants that is responsible for sending smelly messages when there is a shortage of food. (.....)
- It is the kind of pitched sounds produced by humpback whales in summer months. (.....)

2 (A) Put (✓) or (X):

- Bats use their eyes to get information about their surroundings in the dark. ()
- Humpback whales produce high-pitched sounds during mating season. ()
- Soldier ants are responsible for alerting the colony in case of danger. ()

(B) What happens if:

- The amount of food in the ants' colony decreases?

- The smell sense of ants becomes weak?

3 (A) Complete the following sentences:

- The echo picked up by a blind person's cane is turned into that the person can feel them with their
- Ants use their sense of to communicate with each other.
- Humpback whales use the sense of to communicate with each other.

(B) Give a reason for:

- Humpback whales sing different songs.

Concept 1.3

Lesson 1

Self-Assessment 10

15

1 (A) Put (✓) or (X):

1. Nocturnal animals have larger eyes than humans. ()
2. The human eyes can see in the dark clearly. ()
3. Cats have excellent night vision, while humans don't. ()

(B) Write the scientific term:

1. They are objects that emit their own light. (.....)
2. It is the visible form of energy that enables us to see. (.....)

2 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Eye	(a) can hunt at night due to the bouncing off light energy.
2. Bat	(b) is the organ that is affected by light and responsible for sight.
3. Fishing cat	(c) can hunt at night due to the bouncing off sound energy.

1. 2. 3.

(B) Write the name of the device in the opposite figure, then mention its importance:



3 (A) Choose the correct answer:

1. Animals that have an excellent night vision for hunting, include
 (a) cat and bat (b) owl and jerboa (c) owl and bat (d) owl and cat
2. The pupils of the human eyes open those of the nocturnal animals' eyes.
 (a) wider than (b) similar to (c) narrower than (d) typical to
3. Each of the following is considered a source of light, except the
 (a) fire (b) sun (c) lamp (d) mirror

(B) Give a reason for:

1. Cats' eyes seem to glow in the dark.

2. The moon appears luminous although it is not a source of light.

1 (A) Choose the correct answer:

1. A shadow is formed when light falls on wood because it is material.
 (a) an opaque (b) a smooth (c) a transparent (d) a rough
2. Light rays pass through lenses, so they are made up of
 (a) wood (b) mirror (c) glass (d) metal
3. A mirror reflects light a painted surface.
 (a) better than (b) less than (c) typical to (d) similar to

(B) What happens if:

1. Light rays fall on a shiny, smooth surface like a mirror?

2. You place an opaque object between a light source and a wall?

2 (A) Correct the underlined word:

1. Light rays travel in the form of zigzag lines in the air. (.....)
2. Carton, paper, and wood are transparent materials. (.....)
3. If I can see my face clearly on a surface, this means that it is a rough surface.
 (.....)

(B) Compare between each of the following:

P.O.C	Transparent materials	Opaque materials
Definition		

3 Cross out the odd word:

1. Paper – Glass – Water – Air (.....)
2. Wood – Mirror – Book – Wax (.....)

(B) Look at the opposite figures, the complete the sentences below:

1. The surface in figure (A) is considered as a surface, because
2. The surface in figure (B) is considered as a surface, because

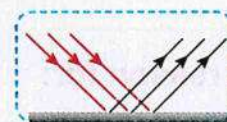


Figure (A)



Figure (B)

Concept 1.3

Lesson 3

Self-Assessment 12

15

1 (A) Choose the correct answer:

- Writing and reading are types of communication among
 (a) humans (b) birds (c) plants (d) animals
- Fireflies can communicate with each other through
 (a) smell sense (b) light (c) songs (d) sounds
- Fireflies use their sense of to communicate.
 (a) hearing (b) taste (c) smell (d) sight

(B) Complete the following sentences:

- Light is produced as a result of a that occurs inside the bodies of fireflies.
- Fireflies use their to release flashes of light.

2 (A) Put (✓) or (X):

- A firefly is not a bird but it is a type of reptiles. ()
- Changing the pattern of lighting up in a firefly is a structural adaptation. ()
- Fireflies are found on mangrove trees in Thailand. ()

(B) What happens if:

- A firefly can't emit flashes?

- A firefly wants to attract a mate to reproduce?

3 (A) Classify the following items according to the energy used to communicate:

(Traffic lights – Car horn – Fire alarm – Language)

Item(s) can use sound energy	Item(s) can use light energy

(B) Give a reason for:

- Fireflies emit a luminous flash.

Concept 1.3

Lesson 4

Self-Assessment 13

15

1 (A) Put (✓) or (X):

1. Animals use different senses to communicate with each others. ()
2. Writing is a type of codes which consists of symbols that gives a specific meaning according to arrangement of letters. ()
3. Lighthouse sends sound codes that tell sailor where they are. ()

(B) Write the scientific term:

1. It is a pattern that has a meaning. ()
2. It is a code that means that you say "no". ()

2 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Fireflies	(a) can be used by people to communicate over distance of many kilometers.
2. Drums	(b) depend on light energy to communicate.
3. Signal fires	(c) is a way of coding that uses the sense of hearing to communicate.

1. 2. 3.

(B) Complete the following sentences:

1. When your receive the signals of the red traffic light, it sends messages to the that decodes the meaning.
2. is the sense organ that detects the sound energy.

3 (A) Choose the correct answer:

1. Travelers use to attract the attention of helicopter pilots to rescue them.
(a) sound (b) mirrors (c) wood (d) food
2. All the following are examples of codes, except
(a) traffic lights (b) language (c) sleeping (d) thumbs-up
3. The signals of is collected by your ears.
(a) a fire alarm (b) lighthouse (c) rescue flare (d) traffic lights

(B) Give a reason for:

- Facial expressions are important for communicating with other people.

(C) Mention two examples of a code.

Concept 2.1

Lesson 1

Self Assessment 14

15

1 (A) Choose the correct answer:

1. To slow down the speed of a Shockwave truck quickly, the driver uses
☐ (a) engines ☐ (b) rockets ☐ (c) brakes ☐ (d) parachutes
2. The force that is used to kick a ball with your foot is
☐ (a) a pull ☐ (b) a push ☐ (c) sound ☐ (d) light
3. The speed of the Shockwave truck is that of a normal truck.
☐ (a) slower than ☐ (b) faster than ☐ (c) similar to ☐ (d) equal to

(B) Write the scientific term:

1. It is the force that you use to move an object away from you. (.....)
2. It is the force that you use to move an object toward you. (.....)

2 (A) Put (✓) or (X):

1. The body whose position does not change is in a static state. ()
2. Air has no force. ()
3. Lifting up a bag from the ground is a pushing force. ()

(B) Give a reason for:

1. A cart starts moving when air comes out of the fire extinguishers.
.....
2. The speed of a jet airplane is greater than the speed of a truck.
.....

3 (A) Complete the following sentences using the words below:

(push – force – less – more – pull)

1. The stopping object can't move until a acts on it.
2. There are two types of forces which are and forces.
3. The engine of an airplane is powerful than that of a normal truck.

(B) What happens if:

1. You kick the ball with a certain force?
.....
2. We increase the number of fire extinguishers fixed onto a cart?
.....

1 (A) Put (✓) or (X):

1. An object moves when balanced forces act on it. ()
2. A pulling force is used to operate an electrical switch. ()
3. When the position of an object changes relative to a fixed point, it moves. ()

(B) Write the scientific term:

1. It is the change in an object's position relative to a fixed point. (.....)
2. It is a push or a pull that is applied on an object. (.....)

2 (A) Choose the correct answer:

1. The force that pulls objects down toward the Earth is called
 (a) gravity (b) magnetism (c) pushing force (d) electricity
2. When an object is in motion, this means that its changes.
 (a) color (b) shape (c) position (d) size
3. You can't see the movement of
 (a) a flying airplane (b) a running horse
 (c) sea waves (d) the planet Earth

(B) What happens if:

1. Balanced forces act on a static object?

2. You let a ball from your hand?

3 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Balanced forces	(a) is a pulling force.
2. Gravity	(b) cause the movement of static objects.
3. Unbalanced forces	(c) don't change the position of a static object.

1. 2. 3.

(B) Observe the opposite figure, and then answer the following questions:

1. Are the forces on both sides balanced or unbalanced?
2. In which direction will the rope move? (Right or left)



Concept 2.1

Lesson 3

Self Assessment 16

15

1 (A) Complete the following sentences using the words below: (shorter – longer – friction – decrease)

1. There is a force between the car tires and the road that acts to the car's speed gradually.
2. When you kick a ball gently, it moves for a distance.
3. When the same force acts on a small car and a truck, the small car will move for a distance.

(B) Write the scientific term:

- It is the force that opposes the motion of a moving object. (.....)

2 (A) Put (✓) or (x):

1. Gravity is the force that arises between the surfaces of two objects in contact. ()
2. Friction force acts in the same direction of the motion of objects. ()
3. When a car crashes into a wall, it will stop. ()

(B) Give a reason for:

1. When a ball is pushed on the ground, it moves a distance and then stops.
.....

2. A moving car stops when it crashes into a wall.
.....

3 (A) Choose the correct answer:

1. On throwing a ball up in the air, it will fall down due to the effect of force.
(a) pushing (b) friction (c) magnetism (d) gravity
2. cause(s) an object move, while cause(s) a moving object stop.
(a) Friction force – balanced forces (b) Balanced forces – friction force
(c) Unbalanced forces – friction force (d) Unbalanced forces – gravity
3. The force that occurs when an object rubs against another object is called force.
(a) friction (b) gravity (c) pull (d) push

(B) What happens if:

1. A boy on a bike stops pedaling?
.....

2. You hit a ball strongly with your foot?
.....

1 (A) Put (✓) or (x):

1. When work is done, there's a transfer of energy. ()
2. The goalkeeper can stop the ball by applying a pulling force against the ball. ()
3. If a person moves a table through a distance, there's a work done. ()

(B) Write the scientific term:

1. It is the force that pulls objects down toward the Earth. (.....)
2. It is the force that arises between the surfaces of two objects in contact. (.....)

2 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Force	(a) needs a pulling force.
2. Energy	(b) transfers energy and enable us to do work.
3. opening a drawer	(c) is the ability to do work.

1. 2. 3.

(B) Complete the following sentences:

1. When a force acts against the direction of motion of an object, its speed
2. The work done is equal to the amount of transferred by force to move an object.

3 (A) Choose the correct answer:

1. When a force moves an object, that means there's is done.
 (a) energy (b) speed (c) work (d) motion
2. You need to do work.
 (a) energy (b) mass (c) friction (d) light
3. You are doing work when
 (a) sitting on a chair (b) sleeping
 (c) pushing a wall (d) kicking a ball

(B) Give a reason for:

- You aren't doing work while you are sitting on a chair.

(C) What happens if:

- A moving car run out of fuel?

Concept 2.2

Lesson 1

Self Assessment 18

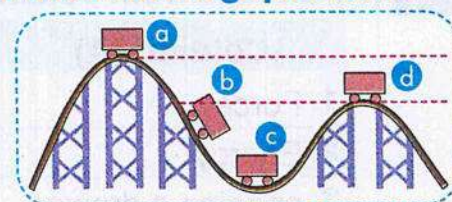
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1 (A) Choose the correct answer:

1. The roller coaster cars do not need electricity, while
(a) moving up (b) sliding down (c) starting motion
2. When the roller coaster stops, its energy of motion
(a) becomes zero (b) increases (c) decreases
3. When a car moves up a ramp, this happens due to the effect of
(a) gravity force (b) kinetic energy (c) balanced force

(B) Look at the opposite figure, and then answer the following questions:

1. What happens to the speed of the roller coaster when it moves from point (a) to point (b)?
2. What happens to the energy of the roller coaster when it moves from point (c) to point (d)?



2 (A) Put (✓) or (X):

1. When an object moves down a ramp, its stored potential energy changes to a less active form of energy. ()
2. When a roller coaster reaches the top, it stores kinetic energy. ()

(B) Write the scientific term:

1. It is the form of energy that increases when the object's speed increases. ()
2. It is the energy stored inside objects. ()

3 (A) Complete the following sentences using the word below: (potential – electrical – kinetic)

1. When the roller coaster reaches the lowest point of the hill, it has the most energy.
2. When the roller coaster reaches the top of the hill, it has the most energy.
3. energy helps us to operate most devices in house.

(B) Give a reason for:

1. The kinetic energy of a roller coaster increases when it moves down a ramp.
.....
2. The roller coaster at the top of a ramp has a kind of energy although it doesn't move.
.....

1 (A) Put (✓) or (X):

1. Work is a push or pull that causes an object to move. ()
2. In a roller coaster, kinetic energy is converted into potential energy. ()
3. Kinetic energy is the energy gained by an object due to its motion. ()

(B) Give a reason for:

1. A car moving on the road has energy.
.....
2. A bird flying up in the sky, its potential energy increases.
.....

2 (A) Choose the correct answer:

1. The form of energy that can be seen is the energy.
 (a) thermal (b) light (c) electrical (d) sound
2. The ability to do work or make a change is known as
 (a) power (b) friction (c) energy (d) gravity
3. If you throw a ball upward, its kinetic energy, while its potential energy
 (a) increases – increases (b) decreases – decreases
 (c) increases – decreases (d) decreases – increases

(B) What happens if:

1. When you let a ball falls down from your hand? (According to energy change)
.....
2. You transfer a book to a lower shelf? (According to its potential energy)
.....

3 (A) Complete the following sentences using the words below:

(kinetic – work – potential)

1. The energy stored in an object due to its position is known as energy.
2. When you apply a pushing force to an object causing its movement, this means is done.
3. As an object moves faster, its energy increases.

(B) In the opposite figure:

- Which ball stores greater potential energy? And why?
.....



Concept 2.2

Lesson 3

Self Assessment 20

15

1 (A) Choose the correct answer:

- Electrical energy is converted into energy in the electric heater.
(a) thermal (b) potential (c) sound (d) chemical
- An object has the least potential energy when it is placed at a height of
(a) four meters (b) three meters (c) two meters (d) one meter
- When we turn on an electric lamp, energies are produced.
(a) sound and chemical (b) light and thermal
(c) sound and light (d) solar and light

(B) Give a reason for:

- There's an energy transformation when you turn on the flashlight.
.....
- The food we eat has energy.
.....

2 (A) Put (✓) or (x):

- The gasoline inside a car stores kinetic energy. ()
- Energy can't be transformed from one form to another. ()

(B) Look at the opposite figure, then complete the sentences below:

- The spring stores energy.
- On leaving the spring to move freely,
energy is converted into energy.



3 (A) Cross out the odd word:

- Sound – Food – Light – Electricity (.....)
- Electrical energy – Thermal energy – Chemical energy – Sound energy (.....)
- Food – Battery – Natural gas – Compressed spring (.....)

(B) What happens if:

- A boy moves down the slide? (According to the change of energy)
.....
- You switch on the electric fan in the house? (According to the change of energy)
.....

Concept 2.2

Lesson 4

Self Assessment 21

15

1 (A) Put (✓) or (X):

1. Any static object lying at a height from Earth's surface has potential energy. ()
2. Energy is not destroyed, but it changes from one form to another. ()
3. We can see the movement of electricity through a wire. ()

(B) Write the scientific term:

1. It is the ability to do work or make a change. ()
2. It is the energy stored in the gasoline inside a car. ()

2 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Light energy	Ⓐ is the energy produced on turning on a radio.
2. Chemical energy	Ⓑ is a form of kinetic energy that is stored inside the food we eat.
3. Sound energy	Ⓒ is a form of potential energy that is stored inside the food we eat.
	Ⓓ is a form of kinetic energy that can be seen.

1. 2. 3.

(B) What happens if:

- You transfer a book from the ground to a table? (According to its potential energy)

(C) Look at the opposite figure, then complete the sentence below:

- The battery in the opposite figure stores energy that is converted into energy and thermal energy on putting it inside a flashlight.



3 (A) Cross out the odd word:

1. Light energy – Thermal energy – Sound energy – Electrical energy ()
2. Guitar – Flashlight – Radio – Alarm bell ()
3. Light – Sound – Friction – Heat ()

(B) Mention the two factors that affect the potential energy of an object.

.....

Concept 2.3

Lesson 1

Self Assessment 22

15

1 (A) Choose the correct answer:

1. When the driver stops suddenly, all the passengers will move
(a) upward (b) forward (c) backward (d) downward
2. Airbags inflate automatically when in cars detect a crash.
(a) vents (b) seatbelts (c) sensors (d) holes
3. When the objects collide with each other, is transferred between them.
(a) time (b) distance (c) energy (d) nothing

(B) Write the scientific term:

1. It is a heavy steel ball that swings on a cable and it is used in the destruction of parts of buildings. (.....)
2. It is safety equipment that provides a soft cushion when it inflates automatically with a gas during a car crash. (.....)

2 (A) Put (✓) or (X):

1. After a car collision, the airbags deflate as fast as they inflate. ()
2. When a tennis ball hits the racket, we hear a pop sound. ()
3. Seatbelts absorb the energy of the passengers during collision. ()

(B) What happens if:

- A ball collides with the tennis bat?

(C) Observe the image carefully and then answer:

- In the image, there are means of safety equipment passengers during a collision, which are?



3 (A) Complete the following sentences using the word below: (potential – nylon – sound – kinetic – steel)

1. When a cricket bat hits a ball, its energy transfers to the ball.
2. Airbag is made of, while the wrecking ball is made of
3. Collision always produces energy.

(B) Give a reason for:

- Airbags deflate quickly after a car crash.

Concept 2.3

Lesson 2

Self Assessment 23

15

1 (A) Put (✓) or (X):

1. As an object moves slower its kinetic energy increase. ()
2. We can measure the covered distance in kilometer unit. ()
3. The object's speed isn't affected by changing the direction of an object. ()

(B) Complete the following sentences:

1. The distance covered per unit time is known as
2. The speed increases by increasing the of the ramp.

2 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Speed	(a) is measured in kilometer.
2. Distance	(b) is measured in km/hr.
3. Time	(c) is measured in second.

1. 2. 3.

(B) What happens to:

1. The kinetic energy of a toy car rolling down on a ramp on decreasing its angle of inclination?
.....

2. The kinetic energy of a car if its speed increases?
.....

3 (A) Choose the correct answer:

1. The result of dividing the travelled distance by the time taken to cover it equals

(a) energy (b) force (c) mass (d) speed

2. When the speed of the car increases, its increases.

(a) potential energy (b) mass
(c) kinetic energy (d) volume

(B) Give a reason for:

- The angle of inclination of a ramp affects the speed of the object moving down on it.
.....

(C) Calculate the speed of train that covers 600 km in a time of 3 hours.

.....

Concept 2.3

Lesson 3

Self Assessment 24

15

1 (A) Choose the correct answer:

- When the speed of object decreases, its kinetic energy
(a) decreases (b) increases (c) doesn't change (d) doubles
- energy is transferred between two objects during a collision.
(a) Potential (b) Thermal (c) Electrical (d) Kinetic
- is the factor that affects both potential and kinetic energy of an object.
(a) Object's Speed (b) Object's mass
(c) Height from the ground (d) Time

(B) What happens if:

- Two cars moving in the same direction collide with each other?
.....
- Two bodies collide with each other?
.....

2 (A) Put (✓) or (X):

- Speed transfers when collision occurs between a ball and a bat. ()
- A slow-moving object has more energy than a fast-moving object. ()
- The direction of movement of an object affects the force of its collision. ()

(B) Write the scientific term:

- It is the process in which two objects crash into each other. (.....)
- It is a form of energy that depends on an object's speed and mass.
(.....)

3 (A) Complete the following sentences using the words below:

(decreases – increases – mass – collision – speed)

- When the mass of a body increases, the force of collision
- occurs when two bodies bump or crash into each other.
- Kinetic energy increases by increasing the and of an object.

(B) Give a reason for:

- Collision between two objects usually produces a pop sound.
.....

1 (A) Choose the correct answer:

1. When you raise the first ball of Newton's Cradle without leaving it, it stores energy.

- (a) light (b) kinetic (c) potential (d) sound

2. On pushing a marble towards some other marbles, energy transfers from your hand to the marbles.

- (a) kinetic (b) potential (c) sound (d) thermal

(B) Complete the following sentences:

1. When two objects are collided to each other; the amount of energy after collision is the amount of energy before collision.

2. Newton's cradle loses energy in the form of and energies.

2 (A) Put (✓) or (X):

1. A large vehicle causes less damage when it hits a small vehicle moving with the same speed. ()

2. The thermal energy produced by the pendulum is due to the force of friction. ()

3. When the speed of a body increases, the force of the collision decreases. ()

(B) What happens if:

1. The force acting on a moving object increases? (According to its kinetic energy)

2. You leave the moving balls in Newton's cradle long enough?
(According to travelled distance)

3 (A) Look at the opposite figure, then choose the correct answer:

1. On raising the first ball upward without leaving it, its kinetic energy

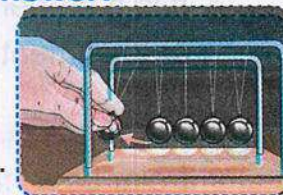
- (a) increases (b) becomes zero

2. During collision between the balls, energy is

- (a) destroyed (b) transferred

3. The collision between the balls produces

- (a) a pop sound (b) a flashlight



Newton's Cradle

(B) Give a reason for:

• Energy is conserved during collision between the balls of Newton's cradle.

1 (A) Correct the underlined word:

- The long winding tube that its length is about more than six meters is called stomach. (.....)

(B) Mention one example for each of the following:

1. An amphibian.
2. A tree grows in salt water.

(C) Give a reason for:

1. The water lily has wide, floating leaves.
.....
.....
2. The body of a panther chameleon is covered with colored scales.
.....
.....

2 (A) Cross out the odd word:

- Lungs – Alveoli – Gills – Diaphragm (.....)

(B) Write the scientific term:

1. They are air sacs surrounded by blood vessels in the respiratory system. (.....)
2. It is a property that helps a living organism blend in with the surrounding environment. (.....)

(C) What happens when:

1. Polar bear has a black fur?
.....
.....
2. The skin of a frog becomes dry?
.....
.....

3 (A) Choose the correct answer:

1. If you stand barefoot on ice, you will lose feeling in your toes after a few

- (a) seconds (b) minutes (c) hours (d) days

2. Fish extract oxygen gas from the water by their

- (a) skin (b) gills (c) lungs (d) fins

(B) Complete the following sentences:

1. The penguin's body stays warm through a thick layer of and dense

2. is a common organ between the digestive and respiratory systems.

3. During exhalation, air travels up from your to your through trachea.

4 (A) Classify the following sentences into structural or behavioral adaptations:

1. Birds migrate to search for food.

2. The existence of a fat layer under an animal's skin to keep its body warm.

(B) Compare between each of the following:

P.O.C	Kapok tree	Acacia tree
Habitat		

(C) Study the animals in the following picture, then answer the following questions:

1. Why the animal in picture (2) has longer ears than that in picture (1)?



Figure (1)



Figure (2)

2. What happens to the fur color of the animal in picture (1) when snow melts?

1 (A) Cross out the odd word:

- Saliva – Stomach – Esophagus – Small intestine (.....)

(B) Mention one structural adaptation in each of the following organisms:

1. Caracal.

.....

2. Barbary fig.

.....

3. Polar bear.

.....

4. Mangrove tree.

.....

2 (A) Put (✓) or (x):

- The blood vessels in a penguin's feet are away from each other. ()

(B) Write the scientific term:

1. It is an organ through which solid waste leaves the body. (.....)

2. They are the characteristics that help living organisms survive and reproduce in their ecosystems. (.....)

3. It is the gas in air and water that living organisms breathe in during respiration. (.....)

4. It is a muscle that contracts during inhalation and expands during exhalation. (.....)

3 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Air pollution	(a) is good for amphibians survival.
2. Water pollution	(b) is caused by smog.
	(c) is caused due to throwing waste materials in waterways.

1. 2.

(B) Complete the following sentences:

1. Acacia tree stores water in its
2. Panther chameleon has a feet and a like a hand.

(C) Look at the opposite figure then answer the following questions:

- What is the camouflage strategy used by this animal to sneak up on its prey?



4 (A) Choose the correct answer:

1. lives in tundra, while lives in hot desert.
 - (a) Penguin – fennec fox
 - (b) Panther chameleon – agama lizard
 - (c) Arctic-fox – brown bear
 - (d) Arctic fox – fennec fox
2. has thick trunk and narrow leaves.
 - (a) Water lily
 - (b) Palm tree
 - (c) Barbary fig
 - (d) Pine tree

(B) Give a reason for:

1. Some animals have the ability to make camouflage.

.....

2. Kapok tree has hand-shaped leaves.

.....

3. Pine tree has a triangular shape.

.....

1 (A) Choose the correct answer:

- It is difficult for many plants in amazon rainforest to get

(a) air (b) water (c) sunlight (d) poison

(B) Give a reason for:

1. Bull shark has sharp teeth.

.....

2. Fennec fox has long ears, while arctic fox has short ears.

.....

3. A pine tree has needles instead of leaves.

.....

4. Liver and pancreas have an important role in food digestion.

.....

2 (A) Cross out the odd word:

- Penguin – Fennec fox – Polar bear – Arctic fox (.....)

(B) Compare between:

P.O.C	Inhalation process	Exhalation process
Movement of diaphragm		
The air is rich in		

(C) What happens if

1. Frogs have gills instead of lungs?

.....

2. Acacia tree leaves don't have sharp spines?

.....

3 (A) Put (✓) or (x):

1. The panther chameleon puffs its body with air to appear smaller in size. ()
2. The food passes through the large intestine before it goes into the small intestine. ()

(B) Mention one behavioral adaptation in each of the following organisms:

1. Acacia tree.

.....

2. Fennec fox.

.....

3. Starred agama lizard.

.....

4 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Salamander	Ⓐ belongs to birds.
2. Panther chameleon	Ⓑ belongs to amphibians.
	Ⓒ belongs to reptiles.

1. 2.

(B) Give a reason for:

1. Barbary fig has sharp spines.

.....

.....

2. Penguin's body is covered with dense feathers and a thick layer of fat.

.....

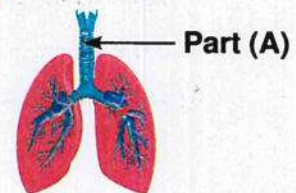
.....

(C) In the opposite figure, mention the function of part (A)?

.....

.....

.....



1 (A) Cross out the odd word:

- Barbary fig – Arctic fox – Fennec fox – Palm tree (.....)

(B) Give a reason for:

1. Fennec fox pants like a dog.

.....

2. Arctic fox hides in burrows at night.

.....

3. Acacia tree has sharp spines around its leaves.

.....

4. Exhausts of cars and factories cause breathing problems.

.....

2 (A) Choose the correct answer:

- Panther chameleon and can be found in the same habitat.

(a) brown bear (b) polar bear (c) caracal (d) fennec fox

(B) Mention one example for each of the following:

1. A non-flying bird.

.....

2. A reptile that lives in hot desert.

.....

3. A plant growing in a fresh water habitat.

.....

(C) What happens when:

- A panther chameleon stands on the leaves of a tree?

.....

.....

3 (A) Put (✓) or (X):

1. The food passes from the mouth to the stomach through a narrow tube known as the esophagus. ()
2. Desert plants are characterized by their big leaves. ()

(B) Write the scientific term:

1. They are air sacs surrounded by blood vessels in the respiratory system. (.....)
2. It is the change in the behaviors or acts of a living organism to help it survive. (.....)
3. It is the structural adaptation that fixes the kapok tree in the soggy soil and supports its trunk. (.....)

4 (A) Classify the following sentences into structural or behavioral adaptations:

1. The countershading in bull shark.

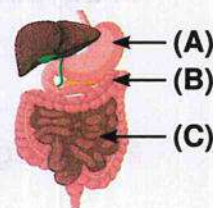
.....
.....

2. Acacia tree leaves produces poison.

.....
.....

(B) Look at the opposite figure, then complete the following sentences:

1. The part (A) mixes the food with and converts it into
2. The part (B) absorbs from the undigested food, while part (C) absorbs from the digested food.



(C) Give a reason for:

- Caracal has a tan-colored fur.

.....
.....

1 (A) Cross out the odd word:

- Brain – Spinal cord – Stomach – Nerves (.....)

(B) Write the scientific term:

1. It is the sense organ that is responsible for detecting different odors. (.....)
2. It is the main control center of the human's body. (.....)
3. It is the system that controls all the body's functions and nerves are one part of it. (.....)
4. It is the bird that can turn its head backwards and has a bowl-shaped face with large eyes. (.....)

2 (A) Choose the correct answer:

1. Feeling hot or cold depends on the sensory receptors in the
 (a) skin (b) eyes (c) ears (d) stomach
2. The time it takes for the body to react to different information (danger) is called the time.
 (a) absorption (b) digestion (c) reaction (d) respiration

(B) Give a reason for:

1. Egyptian mongooses make sounds.

.....

2. The Egyptian jerboa has long hind legs.

.....

3. Owls can turn their head in all directions.

.....

3 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Egyptian jerboas	Ⓐ use echolocation to locate their prey.
2. Humpback whales	Ⓑ are desert rodents with long hind legs.
	Ⓒ can sing underwater to communicate with each other.

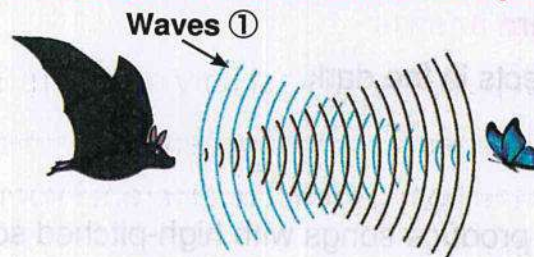
1. 2.

(B) What happens if:

- Your hand touches the thorns of a cactus plant?

.....

(C) Look at the following figure then answer the questions below:



1. What's the name of the property used by the bat in this figure?

.....

2. What's the name of the waves ①?

.....

4 (A) Put (✓) or (X):

- Ants can communicate with each other by singing. ()

(B) Complete the following sentences:

- The sensory receptors in your identify the sour taste of a lemon.
- Dogs are used in guarding because they have shape senses of and
- All parts of the nervous system are connected together by
- Spinal cord is a big nerve that runs through the

1 (A) Correct the underlined word:

- The skin is an important organ of the digestive system. (.....)

(B) Mention one function for each of the following:

1. The brain in the human body.

.....

2. The cane used by a blind person.

.....

(C) Give a reason for:

1. Bats can catch insects in the dark.

.....

2. Humpback whales produce songs with high-pitched sounds in winter.

.....

2 (A) Cross out the odd word:

- Taste – Smell – Hearing – Eyes (.....)

(B) Write the scientific term:

1. They are group of ants that are responsible for locating food. (.....)

2. They are animals that become active at night. (.....)

(C) What happens if:

1. The Egyptian jerboa hears a snake moving towards it?

.....

2. Owls have small eyes?

.....

3 (A) Choose the correct answer:

1. The sense of hearing of dolphins is that of humans.
(a) weaker than (b) sharper than (c) typical to (d) similar to
2. depend on the sharp sense of sight to locate its prey.
(a) Egyptian mongooses (b) Bats
(c) Owls (d) Dolphins

(B) Complete the following sentences:

1. Sense organs collect information from the surroundings and send it to the to be interpreted.
2. Nerves of the are connected directly to the brain.
3. The senses of and help foxes to avoid danger.

4 (A) Classify the following sentences into structural or behavioral adaptations:

1. Hopping of jerboa in zigzag patterns.

2. Owl can turn its head in all directions.

(B) Look at the following diagram then answer the following questions:



1. What do organ ② and organ ③ represent?
2. What are the type of nerves found in organ ① that receives the information from the surrounding?

1 (A) Cross out the odd word:

- Nose – Tongue – Skin – Smell

(.....)

(B) Give a reason for:

1. Owls can hunt at night.

.....

2. The Egyptian jerboa can jump for long distances.

.....

3. Animals that live in hot regions become active at night.

.....

4. Dolphins have super sense of hearing.

.....

2 (A) Choose the correct answer:

- The nervous system of consists of the brain, spinal cord and nerves, such as elephants and dogs.

(a) rodents

(b) birds

(c) mammals

(d) reptiles

(B) Mention one example for each of the following:

1. A flying mammal.

.....

2. A reflex action.

.....

(C) What happens if:

1. High-pitched sounds produced by a bat hit a mosquito?

.....

2. Humpback whales can't sing under water?

.....

3 (A) Put (✓) or (X):

1. The reflexes are fast messages; you are barely aware of them. ()
2. Both ants and acacia tree can send smelly messages. ()

(B) Write the scientific term:

1. It is the season in which humpback whales produce low-pitched sounds. (.....)
2. It is the sense organ used to identify different colors. (.....)
3. It is the bouncing of sound waves when they hit a solid object. (.....)

4 (A) Classify the following sentences into structural or behavioral adaptations:

1. Owls have large ears.

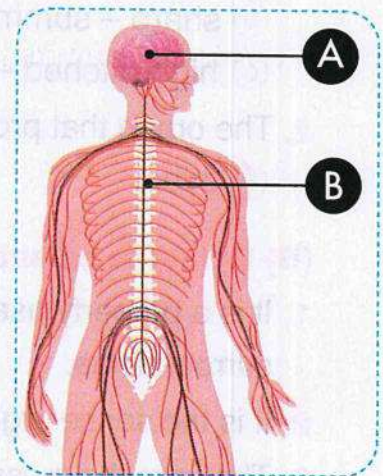
.....
.....

2. Bats become active at night.

.....
.....

(B) Look at the opposite figure, then complete the following sentences:

1. This figure represents the human system.
2. Part (A) represents the
3. The function of part (B) is
and it is located inside



1 (A) Cross out the odd word:

• Humpback whales – Jerboa – Ants – Bats

(.....)

(B) Give a reason for:

1. Humans can differentiate between different sounds.

.....

2. The soldier ants send smelly messages to other ants in the colony.

.....

3. Panther chameleon has sharp sense of taste and sight.

.....

4. Owls have a bowl-shaped face and feathers around its head.

.....

2 (A) Choose the correct answer:

1. Humpback whales produce sounds in months.

(a) sharp – summer

(b) low-pitched – winter

(c) high-pitched – summer

(d) sharp – winter

2. The organ that processes the information collected from the eyes is the

(a) eye

(b) spinal cord

(c) nerves

(d) brain

(B) Write the scientific term:

1. It is a property used in blind people canes to help them detect their surroundings. (.....)

2. It is the sense organ that can detect different sounds. (.....)

3. They are the messages sent by the nervous system so fast that you are barely aware of them. (.....)

3 (A) Put (✓) or (X):

- The spinal cord isn't connected to the brain.

()

(B) Complete the following sentences:

1. Humpback whales communicate with each other by their sense of , where they sing a wide range of notes and a series of
2. Owl has large , while jerboa has large
3. The system which is responsible for reflexes is the
4. When the is low in a colony, send smelly messages to scout ants.

4 (A) Choose from column (A) what suits it in column (B):

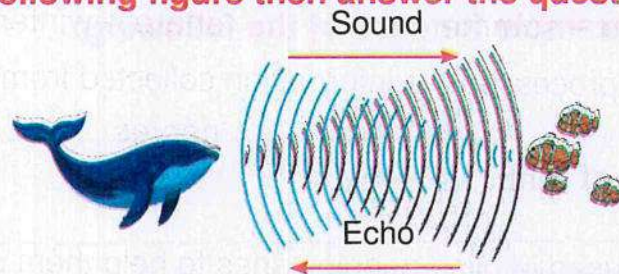
Column (A)	Column (B)
1. Egyptian mongooses	(a) use echolocation to locate their prey.
2. Dogs	(b) produce sounds like a chatter to communicate with each other.
	(c) use the senses of sight and smell to recognize friends.

1. 2.

(B) What happens if:

- Egyptian jerboa has short hind legs?

(C) Look at the following figure then answer the questions below:



1. What's the name of the property used by the dolphin in this figure?
.....
2. Mention the name of another animal that uses this property in air?
.....

1 (A) Cross out the odd word:

• Air – Water – Wood – Glass

(.....)

(B) Give a reason for:

1. A mirror reflects light better than a painted surface.

.....
.....

2. The pupil of nocturnal animals' eyes opens wider than those of humans' eyes.

.....
.....

3. A shadow is formed when light falls on an opaque object.

.....
.....

4. Fireflies emit luminous flashes.

.....
.....

2 (A) Choose the correct answer:

• Light is a form of

(a) Force

(b) work

(c) matter

(d) energy

(B) Mention one example for each of the following:

1. Beetles.

.....
.....

2. A natural source of light.

.....
.....

3. A liquid transparent object.

.....
.....

4. A behavioral adaptation in fireflies.

.....
.....

3 (A) Put (✓) or (X):

1. Light travels in straight lines. ()
2. Speaking is the only way of communication between people. ()

(B) Write the scientific term:

1. It is a device that a human can depend on to see in the dark. (.....)
2. It is the feature of light helps you see yourself in the mirror. (.....)
3. They are materials that we can't see through. (.....)

4 (A) Classify the following materials into transparent and opaque materials:

(An aluminum pot – Lenses – Glass bottle – Rock)

Transparent materials	Opaque materials
.....	
.....	
.....	

(B) Look at the opposite figure, then complete the sentence below:

- The shadow of the box is formed, because the box is object that doesn't allow light to pass through, but it some light rays, and other light rays in direction(s).



(C) What happens when:

- Light falls on a shiny, smooth surface like a mirror?

.....
.....

1 (A) Cross out the odd word:

• Flashlight – Moon – Fire – ~~Candle~~

(.....)

(B) Give a reason for:

1. Wood is considered an opaque material.

.....
.....

2. Nocturnal animals can see better than human in dim light.

.....
.....

3. You can see an object placed behind a glass cup or lens.

.....
.....

4. Cats' eyes seem to glow in the dark.

.....
.....

2 (A) Put (✓) or (X):

• You can see objects that emit their own light or reflect light.

()

(B) Complete the following sentences:

1. Different languages have different

2. The form of energy that can be seen is energy.

3. The pupils of eyes of nocturnal animals usually open than pupil of a human eye.

4. The human body is considered as a/an object.

3 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Echolocation	(a) is a method of communication used by humans and animals.
2. Writing	(b) is a method of communication used by humans only.
	(c) is a method of communication used by animals only.

1. 2.

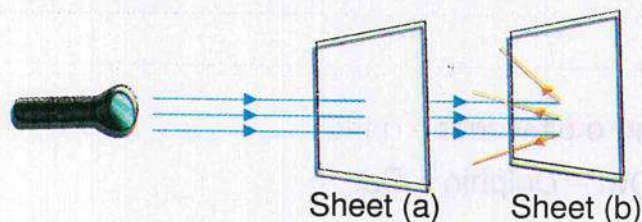
(B) What happens if:

1. Light falls on a rough surface, such as wood or paper?

2. A firefly wants to attract a mate to reproduce?

3. You place an opaque object between a light source and a wall?

4 (A) Look at the following figure, then choose the correct answer:



1. Sheet (a) is made up of

- (a) wood (b) aluminum (c) glass (d) cardboard

2. Sheet (b) represents a surface such as

- (a) smooth – mirror (b) rough – mirror
(c) smooth – wood (d) rough – wood

(B) Write the scientific term:

- It is a body that appears lighted in the sky, but it is not considered as a source of light. (.....)
- They are materials that don't allow light to pass through. (.....)
- They are objects that emit their own light. (.....)

1 (A) Correct the underlined word:

- The moon is one of the light sources in the sky. (.....)

(B) What's meant by each of the following:

1. Source of light.

.....

2. Code.

.....

(C) Give a reason for:

1. Glass is a transparent material.

.....

.....

2. A mirror reflects light better than a painted surface.

.....

.....

2 (A) Cross out the odd word:

- Fishing cat – Owl – Dolphin – Bat (.....)

(B) Write the scientific term:

1. It is a structural adaptation in the eye, which helps animals in hunting at night and avoids being hunted by other animals. (.....)
2. It is the organ that is affected by light and responsible for vision. (.....)

(C) What happens when:

1. Fireflies do not emit flashes?

.....

2. Your eyes see the red traffic light?

.....

3 (A) Choose the correct answer:

- When light falls on _____, a shadow is formed.
 (a) a glass lens (b) water (c) a glass cup (d) a wooden chair
- Which of the following organs work together to enable you to hear different sounds?
 (a) Ears and brain (b) Eyes and brain
 (c) Nose and brain (d) Tongue and brain

(B) Complete the following sentences:

- Light reflection depends on the _____ of the surfaces of objects.
- Fireflies use their _____ to release flashes.
- Travelers use _____ to attract the attention of helicopter pilots to rescue them.

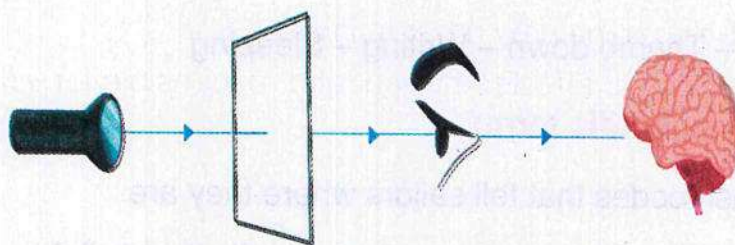
4 (A) Put (✓) or (X):

- If I can see my face clearly on a surface, this means that it is a rough surface. ()
- Nocturnal animals have smaller eyes than humans. ()

(B) Compare between each of the following:

P.O.C	Transparent objects	Opaque objects
Definition		

(C) Study the animals in the following picture, then answer the following questions:



- Which organs work together to enable you see the light ray?

- What happens if the glass sheet is replaced by a cardboard sheet?

1 (A) Put (✓) or (X):

- Fireflies use the sense of sight to communicate with each other. ()

(B) Mention one example for each of the following:

1. An opaque object.

.....

.....

2. A transparent object.

.....

.....

3. An artificial light source.

.....

.....

4. A nocturnal animal with an excellent night vision.

.....

.....

2 (A) Cross out the odd word:

- Thumb up – Thumb down – Writing – Sleeping (.....)

(B) Write the scientific term:

1. It sends flash codes that tell sailors where they are. (.....)
2. They are organisms that communicate by displaying light. (.....)
3. They are materials that allow light to pass through. (.....)
4. It is a pattern that has a meaning. (.....)

3 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Signal fires	(a) are types of communication used by humans and animals.
2. Light and sound	(b) are types of communication used by animals only.
	(c) are used by people to communicate over distances of many kilometers.

1. 2.

(B) Complete the following sentences:

1. energy affects the sensory receptors in the eye, causing vision.
2. A firefly is not a bird but it is a type of
3. is formed when the light strikes a human body.

4 (A) Choose the correct answer:

1. If you want to make a box to see its contents from the outside, which of the following materials can you use?
(a) Cardboard (b) Transparent glass
(c) Opaque plastic (d) Carton
2. Light rays travel in the form of lines in the air.
(a) curved (b) straight (c) circular (d) zigzag

(B) Give a reason for:

1. Glass allows light to pass through.
.....
2. Fire is a source of light, while the moon is not a source of light.
.....
3. The light rays falling on a mirror are reflected on one direction.
.....

1 (A) Correct the underlined word:

- Unbalanced forces cause a change in the object's motion. (.....)

(B) What's meant by each of the following:

1. Friction.

.....

2. Force.

.....

(C) Give a reason for:

1. The Shockwave truck is faster than the normal truck.

.....

2. When you let a ball out of your hand, it falls downward.

.....

2 (A) Put (✓) or (X):

- Hitting a tennis ball needs a pulling force. ()

(B) Write the scientific term:

1. It is the force that pulls objects down toward the Earth. (.....)

2. It is a force that you use to move an object away from you. (.....)

(C) What happens if:

1. The two teams in the tug-of-war game pulls the rope with equal forces?

.....

2. A moving car crashes into a wall?

.....

3 (A) Choose the correct answer:

1. forces cause the movement of static objects.
(a) Balanced (b) Friction (c) Unbalanced (d) Equal
2. You can see the movement of all the following objects, except the movement of
(a) a flying bird (b) a running horse
(c) sea waves (d) the planet Earth

(B) Complete the following sentences:

1. A moving object is affected by forces, while a body at rest is affected by forces.
2. When a force acts against the direction of motion of an object, its speed
3. When you move something towards you, this represents

4 (A) Mention the type of force used to:

1. Open a closed drawer.

.....
.....

2. Kick a ball.

.....
.....

(B) Study the animals in the following picture, then answer the following questions:

1. Which of the two players did more work to push the ball?

(Give a reason to your answer)

.....

2. Which player consumes more energy?

.....

3. What the type of force that causes the two balls stop?

.....



- 1 (A) Mention if the force used in the opposite figure is pull or push.**



(B) What happens if:

- 1.** The two teams in the tug-of-war game pulls the rope with unequal forces?

.....

- 2.** You let a ball out of your hand?

.....

- 3.** You hit a ball strongly with your foot?

.....

- 4.** A driver presses the brakes of the car?

.....

- 2 (A) Put (✓) or (X):**

- An object moves a shorter distance if a greater pushing force is exerted on it.

()

(B) Write the scientific term:

- 1.** It is the force that you use to move an object towards you. (.....)

- 2.** It is the change in an object's position relative to a fixed point. (.....)

- 3.** It is a push or a pull that is applied on an object causing it to change its position. (.....)

- 4.** It is the force exerted when objects rub against each other. (.....)

3 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Gravity	(a) slows down and opposes the motion of a moving object.
2. Friction	(b) pulls objects down toward the Earth.
	(c) pulls objects up toward the sky.

1. 2.

(B) Complete the following sentences:

1. Push or pull actions are considered types of
2. Wearing your socks is force.
3. The body whose position does not change is in a state.

4 (A) Choose the correct answer:

1. The force that is used to kick a ball with your foot is
 (a) a pull (b) a push (c) sound (d) light
2. All the following are examples of motion, except
 (a) a running dog (b) a flying bird
 (c) a sleeping dog (d) a kite travelling through the air

(B) Give a reason for:

1. When a ball is pushed on the ground, it moves a distance and then stops.

2. A book placed on a table doesn't move.

(C) In the opposite figure:



- The box is under the effect of forces and it will move in the direction.

1 (A) Choose the correct answer:

- When you sit on a chair, the force of gravity is and holding you on the chair.
- (a) pushing you upward (b) pulling you upward
 (c) pushing you downward (d) pulling you downward

(B) Give a reason for:

1. The distance traveled by a car varies according to its mass.
.....
2. The speed of a jet plane is greater than the speed of a truck.
.....
3. When you let a ball out of your hand, it falls downward to Earth's surface.
.....
4. The rope in a tug-of-war game moves, when the two teams pull it with unequal forces.
.....

2 (A) Correct the underlined word:

- The balanced forces cause the object to move. (.....)

(B) Compare between:

P.O.C.	Pushing force	Pulling force
Definition		

(C) What happens if:

1. The driver opens the parachutes of a Shockwave truck?
.....
2. You kick the ball with a certain force?
.....

3 (A) Put (✓) or (x):

1. When a car crashes into a wall, it will not stop. ()
2. A pulling force is used to lift a bag from the ground. ()

(B) What's meant by:

- Gravity?

.....

.....

(C) In the opposite figure:

1. What are the forces that affect the book?



.....

.....

2. Are these forces balanced or unbalanced?

.....

.....

4 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. A bicycle	Ⓐ moves five times faster than a normal truck as it is fitted with three jet engines.
2. Shockwave truck	Ⓑ doesn't need an engine to move, but it moves by the effect of the pushing force of your foot.
	Ⓒ doesn't need an engine to move, but it moves by the effect of the pulling force of your foot.

1. 2.

(B) Complete the following sentences:

1. When a car runs out of fuel on a flat road, its speed gradually until it stops.
2. forces cause a change in the object's position.
3. A stopping object can't move until a acts on it.

1 (A) Cross out the odd word:

- Flying bird – Walking person – A leaf moving by wind – Earth's rotation

(.....)

(B) Give a reason for:

1. An object moves when unbalanced forces act on it.

.....

2. Shockwave truck is designed with three parachutes.

.....

3. The thrown ball in air stops, when the goalkeeper catches it with his hand.

.....

4. The speed of a rolling ball on the ground decreases until it stops.

.....

2 (A) Correct the underlined word:

- Friction force acts in the same direction of the object's movement.

(.....)

(B) Write the scientific term:

1. It is the tool used in slowing down and stopping the Shockwave truck.

(.....)

2. It is the type of force used in tug-of-war game.

(.....)

(C) In the opposite figure:



- The body is affected by forces, so it moves to the

3 (A) Put (✓) or (X):

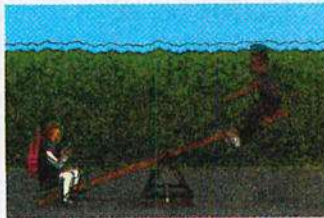
1. The speed of a car decreases when driver presses the brakes due to the force of gravity. ()
2. If a person moves a table through a distance, there's a work done. ()

(B) Complete the following sentences:

1. An apple falling from a tree is caused by the force of
2. Force is or applied on an object causing it to change its position.
3. The force that tries to stop an object moving on a surface is known as

4 (A) Mention if the acting forces in the following pictures are “balanced” or “unbalanced”:

①



②



(B) What happens when:

1. A boy on a bike stops pedaling?
.....
2. Two equal pushing forces act on an object in opposite directions?
.....

(C) What's meant by:

- Motion?
.....
.....

1 (A) Cross out the odd word:

• Thermal energy – Chemical energy – Sound energy – Electrical energy

(.....)

(B) Write the scientific term:

1. It is the energy that the object gains due to its motion. (.....)
2. It is the ability to do work or cause a change. (.....)
3. It is the energy stored in food and batteries. (.....)
4. It is a form of kinetic energy used to operate television. (.....)

2 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Natural gas	Ⓐ stores potential energy.
2. A compressed spring	Ⓑ stores kinetic energy.
	Ⓒ stores chemical energy.

1. 2.

(B) What happens if:

1. You transfer a book to a higher shelf? (According to its potential energy)
.....
2. An object is placed at a height from the Earth's surface?
(According to its potential energy)
.....

(C) In the opposite figure:

- Explain the change in the energy occurring when the boy moves down on the slide.

.....
.....



3 (A) Choose the correct answer:

1. When the roller coaster slides down, its increases.

(a) potential energy	(b) chemical energy
(c) mass	(d) speed
2. energy is transferred from your foot to the ball when you kick it.

(a) Light	(b) Kinetic	(c) Sound	(d) Potential
-----------	-------------	-----------	---------------

(B) Give a reason for:

1. You feel warm when you rub your hands together.

.....
.....

2. There is an energy transformation when you turn on television.

.....
.....

3. The goal net vibrates when a moving ball hits it.

.....
.....

4 (A) Put (✓) or (X):

- When the roller coaster slides down, its kinetic energy decreases. ()

(B) Complete the following sentences:

1. All types of energy can be classified into two main groups, which are and energies.
2. In an electric fan, energy is converted into energy.
3. energy increases as the speed of the object increases.
4. When an apple falls from a tree, its potential energy

1 (A) Correct the underlined word:

- Any moving object has a form of energy known as light energy. (.....)

(B) Mention one example of each of the following:

- 1.A visible for of energy.

.....

- 2.A factor that affects the kinetic energy of a moving object.

.....

(C) Give a reason for:

- 1.The food we eat has energy.

.....

- 2.When an apple falls from a tree, its potential energy decreases.

.....

2 (A) Cross out the odd word:

- Guitar – Flashlight – Radio – Alarm bell (.....)

(B) Write the scientific term:

- 1.It is the form of energy that increases when the object's speed increases.

(.....)

- 2.It is a force that causes an object to move a distance.

(.....)

(C) What happens if:

- 1.You throw a ball upward into air? (According to its potential energy)

.....

- 2.You turn on the gas oven? (According to the change of energy)

.....

.....

3 (A) Choose the correct answer:

1. The energy gained by a ball when it falls from above is energy.
(a) potential (b) kinetic (c) light (d) chemical
2. When the spring is compressed, it stores energy.
(a) thermal (b) potential (c) light (d) chemical

(B) Complete the following sentences:

1. When an electric heater is turned on, it produces energy.
2. The kinetic energy of objects increases as their speed
3. When the object's mass decreases, its potential energy

4 (A) Classify the following energies into potential and kinetic energies:

1. Chemical energy.
.....
.....

2. Sound energy.
.....
.....

(B) What's meant by each of the following:

1. Kinetic energy?
.....
.....

2. Potential energy?
.....
.....

(C) Explain the change in the energy of the sand surfer in the opposite figure.
.....
.....
.....



1 (A) Cross out the odd word:

- Food – Gasoline – Battery – Compressed spring (.....)

(B) Complete the following sentences:

1. When you push a small box with your hand, energy is transferred from to
2. When a skateboarder reaches the top of a hill and stops, his energy becomes zero.
3. Batteries have potential energy in the form of stored energy.
4. The roller coaster stores potential energy as it moves up toward the top of the ramp.

2 (A) Choose the correct answer:

- The potential energy of an object depends on its
- (a) mass only
 - (b) speed only
 - (c) height from the Earth's surface only
 - (d) mass and height from the Earth's surface

(B) Give a reason for:

1. On moving down a ramp, a roller coaster doesn't need any electricity.
.....
2. There is an energy transformation when you turn on a radio.
.....

(C) What happens if:

1. You squeeze a spring?
.....
2. When a spring-powered toy car starts to move?
.....

3 (A) Put (✓) or (X):

1. Electrical energy changes into light energy in the door bell. ()
2. As an object moves faster, its potential energy increases. ()

(B) Write the scientific term:

1. It is the form of kinetic energy produced from movement of particles of a water during heating. (.....)
2. It is the form of potential energy that pulls objects toward the Earth's surface. (.....)
3. It is the invisible form of kinetic energy that travel in air in the form of waves. (.....)

4 (A) Correct the underlined word:

1. Thermal energy is a type of potential energy. (.....)
2. The kinetic energy of a roller coaster decreases when it moves down a ramp. (.....)

(B) Look at the opposite figure, then complete the sentences below:

1. If Ali and Nada holding similar bowling balls at the same height from the ground, the two balls stores amount of energy.
2. When Ali starts to move horizontally, the energy stored in the ball will



1 (A) Cross out the odd word:

- Light energy – Thermal energy – Sound energy – Electrical energy

(.....)

(B) Give a reason for:

1. The potential energy of a roller coaster decreases when it moves down a ramp.

.....

2. An apple on a tree stores a kind of energy due its position from the ground.

.....

3. There is a change in the energy when you clap your hands.

.....

4. When you throw a ball up into the air, its kinetic energy decreases.

.....

2 (A) Put (✓) or (X):

- In the electric fan, the kinetic energy is converted into electric energy.

()

(B) Complete the following sentences:

1. As the height of an object from the ground increases, its energy increases.

2. Electrical energy is a form of energy.

3. The speed of a roller coaster increases as it moves towards the of the ramp.

4. The energy stored in the gasoline inside a car is converted into energy that causes its movement.

3 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Kinetic energy	Ⓐ depends on object's mass and its height from the ground.
2. Potential energy	Ⓑ depends on the object's speed.
	Ⓒ depends on the object's color.

1. 2.

(B) What happens if:

1. A moving ball hits the goal's net?

.....

2. You transfer a book to a higher shelf? (According to its potential energy)

.....

3. You switch on an electric heater? (According to the change in energy)

.....

4 (A) Choose the correct answer:

1. When the spring is compressed, it stores energy.

Ⓐ thermal Ⓑ potential Ⓒ light Ⓓ chemical

2. The energy stored in batteries is considered a form of energy.

Ⓐ potential – chemical Ⓑ chemical – kinetic
Ⓒ chemical – potential Ⓓ light – kinetic

(B) Write the scientific term:

1. It is the form of energy that can be seen. (.....)

2. It is the energy stored in an object due to its position at a certain height from Earth's surface. (.....)

(C) In the opposite figure:

- Mention the change of energy that occurs, when you leave the balloon from your hand.

.....

1 (A) Correct the underlined word:

- When a cricket bat hits a ball, its potential energy transfers to the ball.

(.....)

(B) Mention the importance of each of the following:

1. Wrecking ball.

.....

2. Seatbelt.

.....

(C) Give a reason for:

1. The airbags are very important equipment in the car.

.....

2. The angle of inclination of a ramp affects the speed of the object moving down on it.

.....

2 (A) Cross out the odd word:

- Kilometer – Meter – Second – Time

(.....)

(B) Write the scientific term:

1. It is the distance travelled by a moving object in a unit of time. (.....)

2. It is the process in which two objects crash into each other. (.....)

(C) What happens if:

1. You raise a ball of Newton's Cradle without leaving it?

.....

2. The speed of a body increases? (According to its kinetic energy)

.....

3 (A) Choose the correct answer:

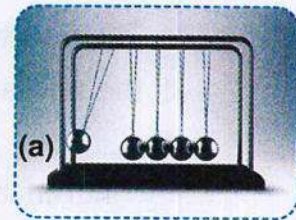
1. Airbag is made of soft
(a) steel (b) nylon (c) linen (d) wood
2. The measuring unit of the distance is
(a) km/s (b) km (c) seconds (d) kg

(B) Complete the following sentences:

1. is the factor that affects both potential and kinetic energy of an object.
2. absorbs the energy of the passengers during collision when they inflate.
3. The speed by increasing the distance.

4 (A) In the opposite figure:

- At position (a), the energy is the greatest of the ball, while the energy is zero.



- (B) If the two cars moved at the same time for 20 seconds, car A covered a distance of 100 meters, while car B covered a distance of 300 meters, Which of the two cars has a higher speed?**

(Give reason to your answer).

.....

.....

.....

- (C) Mention the relationship between the speed of the body and the force of collision.**

.....

.....

.....

1 (A) Cross out the odd word:

- Speed – Energy – Distance – Time

(.....)

(B) Complete the following sentences:

1. Airbags inflate automatically when in cars detect a crash.
2. Collision between moving objects always produces energy.
3. When the driver stops suddenly, all the passengers will move
4. Newton's cradle loses energy in the form of and energies.

2 (A) Choose the correct answer:

- If the angle of inclination of a surface decreases, the speed of a rolling body on it

(a) increases (b) decreases (c) doesn't change (d) is doubled

(B) Give a reason for:

1. Airbags deflate quickly after a car crash.

.....
.....

2. Driving fast is so dangerous.

.....
.....

(C) What happens if:

1. You leave the moving balls in Newton's cradle long enough?

.....
.....

2. Two cars moving in the same direction collide with each other?

.....
.....

3 (A) Put (✓) or (x):

1. The direction of movement of an object doesn't affect the force of its collision. ()
2. Speed transfers when collision occurs between a ball and a bat. ()

(B) Write the scientific term:

1. It is a heavy steel ball that swings on a cable, and it is used in the destruction of building parts. (.....)
2. It is a physical quantity determined by distance and time. (.....)
3. They are found in airbags, and through which gas comes out to let them deflate. (.....)

4 (A) Correct the underlined word:

1. A measurement of how fast an object is moving is known as distance. (.....)
2. When the speed of object increases, its kinetic energy decreases. (.....)

(B) Calculate the speed of a train that covers 600 Km in a time of 2 hours.

.....

.....

.....

.....

(C) Mention safety means used during collision of cars.

.....

.....

.....

Assess Your Learning

School Book Questions on

Unit 1

1

- is/are considered a behavioral adaptation among living organisms.
 - Long ears
 - Living in burrows
 - Large eyes
 - Countershading
- is considered a structural adaptation among living organisms.
 - Birds' migration
 - Panting
 - Brown fur
 - Puffing the body to seem bigger in size
- Some plants have very wide leaves to
 - prevent getting torn by wind
 - prevent animals from eating them
 - reduce loss of water
 - get sunlight
- Which of the following groups reflect light falling on them well?
 - A mirror – a wooden sheet – a metallic spoon
 - A metallic spoon – a cardboard box – a mirror
 - A mirror – an aluminum foil – a metallic spoon
 - An aluminum foil – a brick – a mirror
- The property of helps you to see yourself in the mirror.
 - refraction
 - reflection
 - absorption
 - density
- On being exposed to danger, the system helps in identifying and avoiding it.
 - circulatory
 - digestive
 - respiratory
 - nervous

2

- 1 Inhaled air and exhaled air during the occurrence of the respiration process in a human.
- 2 Structural adaptation and behavioral adaptation in one of the living organisms.
- 3 Communication between humans and communication between animals.

3 Put (✓) or (X):

- 1 The stomach is considered an important organ in the digestive system. ()
- 2 The sense of hearing allows you to see the light of a lamp. ()
- 3 The oesophagus is an important organ in the respiratory system. ()
- 4 The sense of touch allows you to feel the heat of a stove. ()
- 5 Your lungs are important organs in your respiratory system. ()
- 6 The ear is the sensory organ that allows you to hear the birds' singing. ()
- 7 Your heart is an important organ in the nervous system. ()
- 8 The eye is the sensory organ that lets you taste the sour flavor of lemons. ()
- 9 The diaphragm is an important organ in the digestive system. ()
- 10 Your skin is the sensory organ that allows you to feel the smoothness of a cloth. ()

4 Complete the following using the words between the brackets:

**(touching – hearing – light – eyes – ears – heart – brain –
respiratory – lung – stomach – digestive)**

- 1 The sense of helps you identify the noise.
- 2 The send(s) a signal through the nerves that reaches the, so you interpret that sound as a bird's singing.
- 3 The system that digests food to obtain energy is the system, and the most important organ in it is the, while the system that supplies the body with oxygen is the system.

5 Answer the following questions:

- 1 Why does the night vision of a human differ from that of a cat?
- 2 Why bats can't see in the dark, but they can hunt their prey at night?

Assess Your Learning

School Book Questions on Unit 2

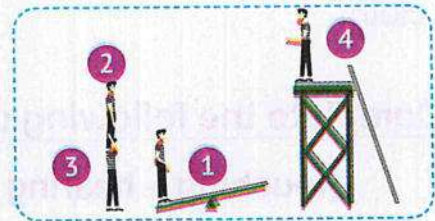
1 Choose the correct answer:

- 1 In the opposite figure, the box is affected by



- a. balanced forces and moves in the right direction
 b. balanced forces and moves in the left direction
 c. unbalanced forces and moves in the right direction
 d. unbalanced forces and moves in the left direction
- 2 The force that decreases an object's speed or slows it down is force.
 a. push b. gravity c. friction d. pull
- 3 In the following figure, the player that has the greatest potential energy is

- a. player number (1)
 b. player number (2)
 c. player number (3)
 d. player number (4)



- 4 The energy that a ball gains while falling from above is called energy.
 a. potential b. kinetic c. light d. chemical
- 5 As the inclination angle of a surface increases, the speed of an object rolling on it
 a. decreases b. increases c. isn't affected d. equals zero
- 6 On collision, the sum of energies before collision is the sum of energies after collision.
 a. equals to b. less than c. more than d. unequal to
- 7 When a moving car stops suddenly, the body of the passenger moves in the direction.
 a. right b. left c. forward d. opposite

2 Answer the following questions:

1 In the opposite figure:

(A) Are the forces between the two teams balanced or unbalanced?



(B) In which direction would the movement of kids be (right or left)?

2 If two cars started to move for the same period of time of **20** seconds, car (A) traveled a distance of **100** meters, while car (B) traveled a distance of **300** meters, which car has the highest speed?

3 In the opposite figure:

On releasing the compressed spring, there's a change from energy to energy.



4 In the opposite figure:

If both the car and the truck move at the same speed, which one causes more damage during the collision and why?



3 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Gravity	a. is the energy stored in an object.
2 Friction	b. is the force that pulls objects downward.
3 Speed	c. is the force that arises between the surfaces of two objects in contact.
4 Potential energy	d. is the stored energy inside dry cells.
	e. is the distance covered in a unit of time.

1

2

3

4

PONY Final Exams

Model Exam 1

1 (A) Cross out the odd word:

- Light energy – Thermal energy – Sound energy – Electrical energy

(.....)

(B) Write the scientific term:

1. It is the force that pulls objects down toward the Earth. (.....)
2. It is the distance travelled by a moving object in a unit of time. (.....)
3. It is a property that helps a living organism blend in with the surrounding. (.....)
4. It is the body system that composes of brain, spinal cord and nerves. (.....)

2 (A) Put (✓) or (X):

- Humans don't need a source of light to see clearly in the dark. ()

(B) Complete the following sentences:

1. help to slow the speed of a person movement forward during a car crash.
2. During inhalation, the air travels down from your throat to you lungs through the
3. is formed when the light strikes a/an object such as a human body.
4. In a Newton's cradle, energy loss occurs in the form of energy due to friction.

3 (A) Choose the correct answer:

1. The keeps its body cool by staying in shaded areas during daytime.
(a) agama lizard (b) arctic fox (c) brown bear (d) polar bear
2. The chemical energy stored in batteries is considered as a form of energy.
(a) sound (b) kinetic (c) heat (d) potential

(B) Give a reason for:

1. Mangrove trees have long, strong roots.
.....
2. When a ball is pushed on the ground, it moves a distance and then stops.
.....
3. The moon is not a source of light.
.....

4 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Dolphins	(a) can turn its head in all directions.
2. Owls	(b) are nocturnal animals that use echolocation property.
	(c) use echolocation to locate their prey in water.

1. 2.

(B) What happens if:

1. You switch on the electric heater in the house?
(According to the change of energy)
.....
2. Your hand touches the thorns of a cactus plant?
.....

(C) Which figure represents the occurrence of the most dangerous collision? And why?
.....



Figure (1)



Figure (2)

Model Exam 2

1 (A) Put (✓) or (X):

- A wrecking ball is made of soft steel.

()

(B) What happens if:

1. The diaphragm relaxes during the exhalation process?

.....

2. Bats cannot use the echolocation property?

.....

3. Balanced forces act on a static object?

.....

4. A firefly wants to attract a mate to reproduce?

.....

2 (A) Cross out the odd word:

- Salamander – Frog – Fish – Toad

(.....)

(B) Mention example of each of the following:

1. A visible form of energy.

.....

2. A nonflying bird.

.....

(C) Give a reason for:

1. The polar bear has thick and white fur.

.....

.....

2. Parachutes are used in Shockwave truck and rockets.

.....

.....

3 (A) Observe the image carefully and then answer:

- In the image, there are means of safety equipment during a collision, which are:

1.
2.



(B) Write the scientific term:

1. They are materials which allow light to pass through. (.....)
2. It is the form of energy that increases when the object's speed increases. (.....)
3. It is an animal with a bowl-shaped face and large eyes. (.....)

4 (A) Choose the correct answer:

1. The energy stored in an object due its position is known as energy.
(a) kinetic (b) electrical (c) chemical (d) potential
2. When an object is in motion, this means that its changes.
(a) color (b) shape (c) position (d) size

(B) Complete each of the following:

1. Birds migrate to search for food is an example of adaptation, while the thick trunk of palm trees is an example of adaptation.
2. When we turn on an electric lamp, and energies are produced.
3. The pupil of nocturnal animals' eyes opens than those of humans' eyes.

Model Exam 3

1 (A) Choose the correct answer:

- Adaptation helps living organisms in all the following, except
 (a) surviving (b) reproduction (c) hiding (d) death

(B) Complete the following sentences:

1. When the food is low in a colony, ants send a smelly message to ants to find food.
2. The in the car prevent the passenger from rushing when the car stops suddenly.
3. Fireflies are found on trees which have long strong to resist water.
4. Batteries store energy, while a compressed spring stores energy.

2 (A) Mention is the force used in the opposite picture is pulling or pushing.

.....



(B) Give a reason for:

1. Acacia tree has a long taproot, while kapok tree has a buttress root.

2. Collision between two objects usually produces a pop sound.

(C) What happens if:

1. The mirror-like membrane in the fishing cat's eyes is not present?

2. You transfer a book to a lower shelf? (According to its potential energy)

3 (A) Put (✓) or (X):

1. Panther chameleon belongs to amphibians, while frogs belong to reptiles. ()
2. Unbalanced forces cause a change in the object's position. ()

(B) Write the scientific term:

1. It is the ability to do work or cause a change. ()
2. It is the main control center of the human's body. ()
3. It is a device that a human can depend on to see in the dark. ()

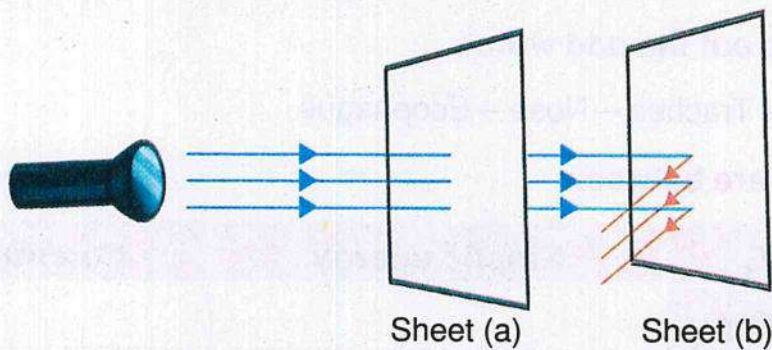
4 (A) Cross out the odd word:

1. Owls – Fishing cats – Foxes – Dolphins ()
2. Thermal energy – Chemical energy – Sound energy – Electrical energy ()

(B) Calculate the speed of a train that covers 500 kilometers in a time 5 hours.

.....
.....

(C) Look at the following figure, then answer the following questions:



1. Mention why do the light rays pass through sheet (a).
.....
.....
2. Is sheet (b) smooth or rough surface? (Give a reason for your answer)
.....
.....

Model Exam 4

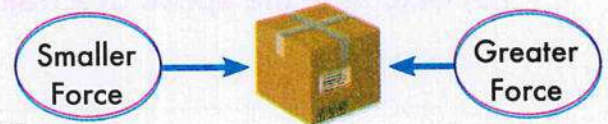
1 (A) Put (✓) or (X):

- Sound is produced as a result of a chemical reaction that occurs inside the bodies of fireflies. ()

(B) Give a reason for:

1. Pollution of air and water can affect the survival of amphibians.
.....
2. The presence of hair on the Egyptian jerboa's feet and toes.
.....
3. There is energy transformation when turn on the washing machine.
.....

(C) In the opposite figure, the body is under the effect of forces and moves to the direction.



2 (A) Cross out the odd word:

- Lungs – Trachea – Nose – Esophagus (.....)

(B) Compare between:

P.O.C	Kinetic energy	Potential energy
Affecting factors		

(C) What happens if:

1. You raise up a ball of newton's cradle without leaving it?
.....
2. The sound waves produced from a dolphin hits a fish under water?
.....

3 (A) Mention if the following adaptations are structural and behavioral:

1. The mirror-like membrane in the fishing cat's eyes.

.....

2. Fireflies change their flash pattern.

.....

(B) Write the scientific term:

1. It is a heavy steel ball that swings on a cable, and it is used in the destruction of building parts. (.....)

2. It is the force that slows down and opposes the motion of a moving object. (.....)

3. It is the system that controls all the body's functions, and nerves are one part of it. (.....)

4 (A) Choose the correct answer:

1. Chemical energy is stored in the

(a) food only

(b) battery only

(c) food and television

(d) food and battery

2. Digestion of food begins in the

(a) stomach

(b) mouth

(c) liver

(d) small intestine

(B) Mention one example of each of the following:

1. A reptile that lives in the tropical rainforest.

.....

.....

2. A smooth shiny surface.

.....

.....

(C) Calculate the speed of train that covers 450 km in a time of 3 hours.

.....

.....

.....

.....

Model Exam 5

1 (A) Choose the correct answer:

- Collision always produces energy.
(a) solar (b) sound (c) potential (d) chemical

(B) Complete the following sentences:

1. All types of energy can be classified into two main groups, which are and energies.
2. The penguin's body stays warm through a thick layer of and dense
3. Humpback whales produce sounds in summer months because they travel better in water.
4. The fishing cat can hunt at night due to the bouncing off energy as they have in the back of its eyes.

2 (A) Cross out the odd word:

- Water – Air – Wood – Glass (.....)

(B) Write the scientific term:

1. It's a property by which a bat can locate insects through the sound reflected from them. (.....)
2. It is a force that causes an object to move a distance. (.....)

(C) Mention one importance of each of the following:

1. Seatbelt.

.....
.....

2. Lighthouse.

.....
.....

3 (A) Put (✓) or (X):

1. When running and making an effort, the number of breathing times increases. ()
2. The speed of a roller coaster increases as it moves towards the top of the ramp. ()

(B) Give a reason for:

1. A shadow is formed when light falls on an opaque object.
.....
2. The Egyptian jerboa has long hind legs.
.....
3. Panther chameleon has V-shaped feet and a long tail.
.....

4 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Bull shark	Ⓐ can live in salt water only.
2. Waterlily	Ⓑ has wide leaves to absorb a large amount of sunlight.
	Ⓒ can live in fresh and salt water.

1. 2.

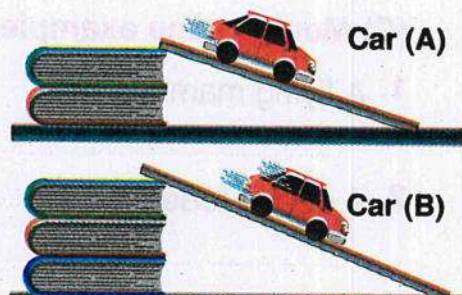
(B) What happens if:

1. A boy on a bike stops pedaling?
.....
2. You switch on a flashlight? (According to the change of energy)
.....

(C) In the opposite figure:

- Which car will cover a longer distance?
(Give reason for your answer)

.....
.....
.....



Model Exam 6

1 (A) Cross out the odd word:

- Palm tree – Barbary fig – Fennec fox – Polar bear

(.....)

(B) Give a reason for:

1. You feel warm when you rub your hands together.

.....

2. Owl can turn its head in all directions.

.....

(C) Write the scientific term:

1. It is a push or pull that is applied on an object causing it to change its position.

(.....)

2. They are objects that emit their own light.

(.....)

2 (A) Correct the underlined word:

- Time is measured in kilometer per hour.

(.....)

(B) Compare between:

P.O.C	Inhalation process	Exhalation process
Movement of diaphragm		
The air is rich in		

(C) Mention one example of each of the following:

1. A flying mammal.

.....

2. A desert rodent.

.....

3 (A) Put (✓) or (X):

1. Acacia tree stores water in its roots. ()
2. In cricket game, the bat transfers its potential energy to the ball. ()

(B) What happens if:

1. Light rays fall on a shiny smooth surface such as a mirror?
.....
2. You throw a ball upwards? (According to its potential energy)
.....

(C) What's meant by:

- Friction?
.....

4 (A) Choose the correct answer:

1. The chemical energy stored in batteries is considered a form of energy.
(a) potential (b) kinetic (c) heat (d) sound
2. use echolocation by producing high-pitched sounds in the air.
(a) Dolphins (b) Owls (c) Whales (d) Bats

(B) Complete the following sentences:

1. Fireflies depend on the sense of to communicate, while ants depend on the sense of to communicate.
2. Kinetic energy increases by increasing the and of an object.

(C) Look at the following figure, then complete:

- Changing the color fur of arctic fox into color when snow melts is considered as a adaptation.



Model Exam 7

1 (A) Choose the correct answer:

- Writing and reading is a type of communication among

(a) humans (b) birds (c) plants (d) animals

(B) Complete the following sentences:

1. Two allow air to pass from the to the two lungs.
2. The speed = ÷
3. The eyes send messages to the through the
4. An apple falling from a tree is caused by the force of

2 (A) Cross out the odd word:

- Polar bear – Pine tree – barbary fig – Arctic fox (.....)

(B) Write the scientific term:

1. It is the energy that the object gains due to its motion. (.....)
2. It is a liquid found in the mouth that facilitates the swallowing of food. (.....)
3. It is the visible form of energy that enables us to see. (.....)
4. It is the organ that is affected by light and responsible for sight. (.....)

3 (A) Correct the underlined word:

1. Fennec fox lives in burrows at night. (.....)
2. Potential energy is transferred between two objects during a collision. (.....)

(B) Give a reason for:

1. Water lily has wide, floating leaves.

.....
.....

2. Air and water are considered transparent materials.

.....
.....

3. A bird flying up in the sky, its potential energy increases.

.....
.....

4 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Pulling force	(a) is used to open a closed drawer.
2. Pushing force	(b) is a type of energy.
	(c) is used to catch a ball is thrown in air.

1. 2.

(B) What happens if:

1. Panther chameleon is exposed to danger?

.....
.....

2. Light rays fall on a rough surface, such as wood or paper?

.....
.....

(C) Look at the following figure, then complete:

- When the spring is compressed, the energy is converted into Energy.



Model Exam 8

1 (A) Cross out the odd word:

- Eye – Ear – Tongue – Hearing

(.....)

(B) Give a reason for:

1. Bat is a nocturnal animal.

.....

2. Driving fast is very dangerous.

.....

(C) Write the scientific term:

1. It is the gas present in air and water that living organisms breathe in during respiration.

(.....)

2. It is an organ through which solid waste leaves the body.

(.....)

2 (A) Would you apply pulling or pushing force to lift a bag from the ground?

.....

(B) Compare between:

1.

P.O.C	Acacia tree	Kapok tree
Habitat		
Shape of leaves		

2.

P.O.C	Transparent materials	Opaque materials
Definition		

(C) Look at the following figure, then complete:

- When the player hits the ball with the bat, the energy of the bat transfers to the ball and its speed



3 (A) Choose the correct answer:

1. The process of vision occurs as a result of the of light.
(a) scattering (b) reflection (c) absorption (d) refraction
2. The sense organs collect information and send signals to the
for processing and understanding.
(a) lungs (b) nerves (c) spinal cord (d) brain

(B) Mention the importance of each of the following:

1. Stomach.

.....

2. Skin for amphibians.

.....

(C) Explain the relation between the kinetic energy of a moving object and its speed.

.....
.....

4 (A) Correct the underlined word:

1. Panther chameleon has sandy-colored scales. (.....)
2. The force that arises between the surfaces of two objects in contact is known as gravity. (.....)

(B) What happens if:

1. You turn on the gas oven? (According to the change of energy)

.....
.....

2. Ant's colony is exposed to danger?

.....
.....

3. A moving car runs out of fuel?

.....
.....

9

1

- ① Reptiles – dry

(B) Complete the following sentences:

- 2.** The sensory receptors in your sense the hotness and coldness of weather, while those in your helps you identify the sour taste of lemon.

2

- Energy before collision is **greater than** the energy after collision. (.....)

(B) Give a reason for:

1. Barbary figs have sharp spines.

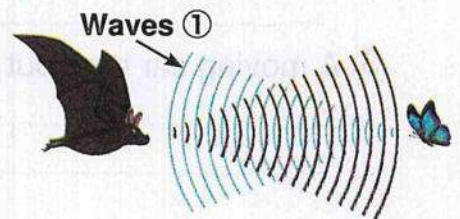
- 2.** A book placed on a table doesn't move.

- 3. Egyptian mongooses produce sounds like chatter.**

(C) Look at the opposite figure then answer the questions below:

1. What's the name of the property used by the bat in this figure?

- 2.** What's the name of the waves ①?



3 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Sound energy	Ⓐ is a visible form of kinetic energy that travels in air in the form of waves.
2. Chemical energy	Ⓑ is an audible form of kinetic energy that travels in air in the form of waves.
	Ⓒ is a form of potential energy that is stored in the food we eat.

1. 2.

(B) What happens if:

1. The pulling force of one of the two teams in tug-of-war game is greater than the other team?
.....

2. The blood vessels in the penguin's feet and toes aren't weave around each other?
.....

3. A boy moves down the slide? (According to the change of energy)
.....

4 (A) Classify the following materials into transparent and opaque:

(Air – Carton – Metal – Glass)

Transparent materials	Opaque materials
.....	

(B) Write the scientific term:

1. It is a muscle that contracts during inhalation and expands during exhalation.
(.....)

2. It is a form of potential energy that causes objects to rush towards the Earth's surface.
(.....)

3. It is the force exerted when objects rub against each other. (.....)

Model Exam 10

1 (A) Cross out the odd word:

- Esophagus – Saliva – Stomach – Small intestine

(.....)

(B) Give a reason for:

1. Gills are unique structural adaptations in fish.

.....

2. Dogs are used in guarding.

.....

3. Firefly beetles produce a chemical reaction inside their bodies.

.....

4. The goal net vibrates when a moving ball hits it.

.....

2 (A) Choose the correct answer:

- Light rays travel in the form of lines in the air.

Ⓐ curved

Ⓑ straight

Ⓒ circular

Ⓓ zigzag

(B) Compare between each of the following:

P.O.C	Arctic fox	Fennec fox
Habitat		
Size of ears		

(C) Mention the function of each of the following:

1. Large intestine.

.....

.....

2. Spinal cord.

.....

.....

3 (A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Pulling force	Ⓐ is the force used to move an object away from you.
2. Pushing force	Ⓑ can be observed when gravity pulls objects upward.
	Ⓒ is the force used to move an object towards you.

1. 2.

(B) Write the scientific term:

1. It is a pattern that has a meaning. (.....)
2. It is the change in an object's position relative to a fixed point. (.....)
3. They are air sacs surrounded by blood vessels in the respiratory system. (.....)

4 (A) Put (✓) or (x):

1. Energy is not destroyed, but it changes from one form to another. ()
2. Seatbelts absorb the energy of the passengers during collision. ()

(B) What happens if:

1. You see the red traffic light as you crossing the road?

.....

2. The kinetic energy of a moving car increases?

(According to the damage during collision)

.....

3. You put an opaque object between a light source and a wall?

.....

Governorate Exams

Model 1 Cairo – New Cairo Directorate

1 (A) Put (✓) or (x) on the following statement:

1. The body of penguin is covered by dense fur in order to be warm. ()
2. The food chain begins with consumers. ()
3. A ball at the top of the hill has potential energy. ()

(B) What happens when turning on the gas oven?

2 (A) Complete the following sentence:

- The main control center of the body is the
 Ⓐ nerves Ⓑ brain Ⓒ spinal cord Ⓓ lung

(B) Give a reason for:

1. Fireflies emit flashlights.
.....

2. The driver uses the seatbelt while driving.
.....

3 (A) Write the scientific term:

- It is a pattern that has meaning. (.....)

(B) 1- Determine the type of adaptation (Structural – Behavioral):

- a. Acacia tree sends a smelly message. (.....)
- b. Fennec fox has large ears. (.....)

2- Write the type of energy (potential – Kinetic):

- a. A book on a table. (.....)
- b. Pushing a wheelbarrow. (.....)

Model 2 Cairo – Ain shams Directorate

1 (A) Choose the correct answer:

1. Animals that live in a hot environment have ears to help them get rid of the excessive body temperature.
 (a) small (b) short (c) long (d) sharp
2. You could determine how loud the train sound is by
 (a) sound pitch (b) sound style (c) sound echo (d) sound type

(B) Observe the image carefully and then answer:

- In the image, there are means of safety equipment passengers during a collision, which are.

1. 2.



2 (A) Put (✓) or (X) on the following statement:

- Nocturnal animals have eyes that are larger than human eyes. ()

(B) Answer the following:

- Which of the following surface represents the reflection of light rays from wooden spoon- and what is reason?

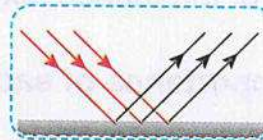


Figure (A)

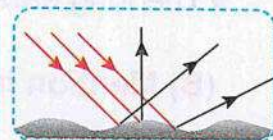


Figure (B)

(C) Calculate the speed of train that covers 450 km in a time of 3 hours.

3 (A) Write the scientific term:

- It is the time that body takes to receive information from the environment. (.....)

(B) Give reasons for:

1. The fennec fox and arctic fox eat all types of food.

2. When a ball is pushed on the ground, it moves a distance and then stops.

Model 3 Cairo – Al shorouk Directorate

1 (A) Choose the correct answer:

1. Fish breathe oxygen dissolved in water by
(a) Lungs (b) Gills (c) Skin (d) Fins
2. An animal that has ability to turn its head in all directions is
(a) Snake (b) Jerboa (c) Dolphin (d) Owl
3. passes the food from pharynx to stomach.
(a) Esophagus (b) Stomach (c) Trachea (d) Alveoli

(B) Write the scientific term:

- It is the ability to do work. (.....)

2 (A) Complete the following statement:

- The long ears of the fennec fox are example of adaptation.

(B) Mention importance of each of the following:

1. Seatbelt.

.....
.....

2. A wrecking ball.

.....
.....

3 (A) Put (✓) or (X) on the following statement:

- Nocturnal animals become active at morning to look for their food. ()

(B) Correct the underlined words:

1. Airbags are made up of thick wooden material. (.....)
2. When the object moves faster, its potential energy increases. (.....)

Model 4 Cairo – Badr Directorate

1 (A) Choose the correct answer:

- The organ responsible for pain when your hands touch spines is
 (a) nerves (b) brain (c) eyes
- The thick white fur is an adaptation in
 (a) panther chameleon (b) polar bear (c) fennec fox
- The book that put on the table stores energy.
 (a) potential (b) light (c) kinetic

(B) What happen if:

- Two cars move in the same direction colloid?

2 (A) Cross out the odd word of the following:

- Long ear in fennec fox - long neck in giraffe - hiding lizard between rocks.

(B) Give a reason for:

- The moon is not considered a source of light.

(C) Find the speed of the car that covers 300 km in 3 hours.

.....

3 (A) Complete the following:

- The nervous system includes and

(B) What's meant by:

- Friction?

(C) Which of the following shows how can light reflect on a mirror?

.....

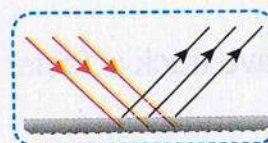


Figure (A)

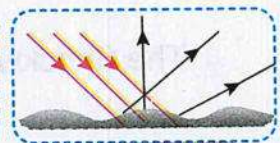


Figure (B)

Model 5 Giza – 6th October Directorate

1 (A) Choose the correct Answer:

- Dolphin depends on their sharp sense of to get food.
 (a) sight (b) taste (c) smell (d) hearing
- The presence of thick white fur is an adaptation in.....
 (a) polar bear (b) forest bear (c) desert lizard (d) bat
- Paper and wood are materials.
 (a) opaque (b) shiny (c) liquid (d) gases

(B) Write one example for:

- A form of potential energy.

2 (A) Put (✓) or (X) on the following statement:

- Digestion process starts in mouth. ()

(B) What happen if:

- Fennec fox has short ear?

- If the body moves down the slide?

3 (A) Cross out the odd word:

- Spinal cord – Lungs – Nerves – Brain (.....)

(B) Give reason for:

- Acacia tree has very long trunk.

- The Shockwave truck is faster than the normal truck.

Model 6 Qalyobia – Banha Directorate

1 (A) Choose the correct Answer:

1. Polar bears have a white fur to
(a) live in desert (b) see in dark
(c) hide from predator or their prey (d) live in forests
2. Ants communicate with each other using
(a) sight (b) smell (c) touch (d) taste
3. Which of the following materials reflect light best
(a) wood (b) cloth (c) mirrors (d) rock

(B) Write the scientific term of each of the following:

- A force that causes objects move toward you. (.....)

2 (A) Correct the underlined word:

- An organ that breaks down food to nutrients is stomach. (.....)

(B) Give reason for the following:

- Egyptian jerboa can jump for long distance.
.....

(C) What happens if:

- A book is transferred from the ground to table?

(According to the potential energy)
.....

3 (A) Put (✓) or (x) on the following statements:

- Rough objects reflect light better than smooth ones. ()

(B) Mention each of the following:

1. The name of organ that contract and relax in respiration process.
.....

2. Two forms of kinetic energy.
.....

Model 7 Alexandria – East Directorate

1 (A) Choose from column (B) what suits them from column (A):

Column (A)	Column (B)
1. Smell	a The force that tries to slow or stop a moving object.
2. Friction	b A force that moves an object away from you.
3. Carbon dioxide	c Ants use it to communicate.
	d A gas produced by respiration.

1. 2. 3.

(B) Write the scientific term of each of the following statements:

- It is the ability to do work or to make a change. (.....)

2 (A) Put (✓) or (x) on the following statements:

- Red and green traffic lights are codes. ()

(B) Give a reason for:

- Glass is a transparent material.

(C) Compare between the following (one example for each one):

Behavioral Adaptation	Structural Adaptation
.....	
.....	

3 (A) Cross the odd word:

- Stomach – Lung – Mouth – Large intestine (.....)

(B) Mention safety means used during collision of cars:

(C) Correct the underlined word:

- Kinetic energy is the energy stored inside the body. (.....)

Model 8 Dakahlia – Educational Directorate

1 (A) Choose the correct Answer:

- pass the food from pharynx to stomach.
(a) Esophagus (b) Stomach (c) Trachea (d) Alveoli
- All of the following are components of the nervous system, except
(a) spinal cord (b) heart (c) nerves (d) brain
- is one of the behavioral adaptations that helps the animal protect itself from enemies.
(a) camouflage (b) extinction (c) immigration (d) reproduction

(B) Study the following picture, and then answer the following questions:

- Are the forces on both sides balanced or unbalanced?
.....

- In which direction will the rope move? (Right or left).
.....



2 (A) Put (✓) or (X) on the following statements:

- Bats use their sense of smell to avoid dangers. (.....)

(B) Answer the following:

- Compare** between transparent and opaque objects.
.....

- Classify** the following energies into kinetic and potential:

- Light – Chemical – Thermal – gravitational

- Give** one function to the airbags:

3 (A) Correct the underlined word:

- Exhale air carries oxygen. (.....)

(B) Answer the following:

- Determine the type of adaptation in the following**.

- (a) Thick, white fur in the polar bear (b) Fennec fox lives in burrows

- Calculate the speed of the train that covers 600km in a time 6 hours.**
.....

- Which of the following consumes less fuel a truck or small car?**
.....

Model 9 Port Said – Porfouad Directorate

1 (A) Choose the correct answer:

1. Fennec fox has to enable blending in the desert.
(a) dark colored fur (b) thick white fur
(c) sandy colored fur (d) black colored fur
2. tree grow in salt water.
(a) Kapok (b) Palm (c) Mangrove (d) Acacia
3. The lungs are organ in the system.
(a) respiratory (b) digestive (c) circulatory (d) nervous

(B) Mention the type of force:

- Forces that pulls objects down toward the Earth.

2 (A) Put (✓) or (X) on the following statement:

- Egyptian jerboa depends on echolocation to find food. ()

(B) Give reasons for the following:

1. The moon is not a source of light.
.....
2. The larger body in the mass causes more damage during collision.
.....

3 (A) Write the scientific term:

- It is the organ affected by light and responsible for vision. (.....)

(B) What happens when:

1. Human lungs are replaced by gills?
.....
2. Pressing the brakes of the car?
.....

1 (A) Put (✓) or (x) on the following statement:

1. Small intestine from the important organs in the respiratory system. ()
2. Firefly beetles communicate by the sense of smell. ()
3. Brain is the main control center in the human body. ()

(B) What happens if:

- The speed of object increases? (According to the kinetic energy)

.....

2 (A) Choose the correct answer:

- All of the following are forms of kinetic energy except the
- ☐ (a) sound ☐ (b) light ☐ (c) food ☐ (d) electricity

(B) Complete the following statement:

1. Panting in fennec fox is considered as adaptation, while long ears is considered as adaptation.
2. We can identify the colors by using sense, while we can differentiate between smooth and rough things by sense.

3 (A) Write the scientific term:

- It is the force that you make to move objects away from you. (.....)

(B) Give reasons for:

1. The moon appears bright although it is not source of light.

.....

2. Electric lamp produces different types of energy.

.....

PONY

سلسلة كتب الأستاذ

2026

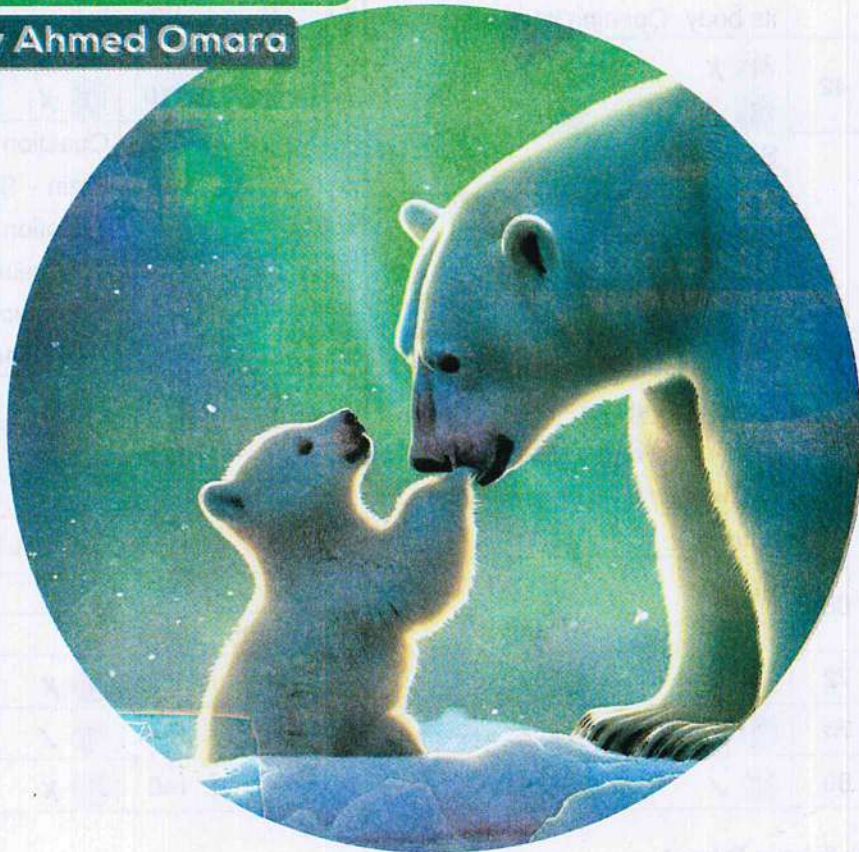
Science

Model Answer

4

Primary
First Term

By Ahmed Omara



Check Your Understanding?

Concept 1.1 – Adaptation and Survival

Activity	Page	Answers	
1	12	1 ✓ 3 X	2 X 4 ✓
2	15	1 X	2 X
3	18	1 ✓ 3 ✓	2 X 4 X
4	28	1 B 3 B 5 B	2 S 4 B
5	30	Structural adaptation: V-shaped feet- Brightly colored scales - Hand-like tail Behavioral Adaptation: Changing scales' color-Puffing up its body- Opening its mouth wide	
7	42	1 X 3 ✓	2 ✓ 4 ✓
8	54	Stomach: It is a muscular organ. - It changes food into a soupy liquid. Small intestine: It absorbs nutrients. - It is a long, winding tube. - Digestion ends in it. Large intestine: It absorbs water. - No digestion happens in it. -It ends with the anus.	
9	65	1 ✓ 3 X	2 X 4 ✓
10	72	1 ✓	2 ✓
11	74	1 ✓	2 ✓
13	80	1 ✓	2 ✓

Concept 1.2 – Senses at work

Activity	Page	Answers	
1	88	1 Skin – touch 2 Eye – sight 3 Nose – smell 4 Tongue – taste 5 Ear – hearing	
2	90	1 X	2 ✓
3	91	1 X	2 ✓
4	98	1 echolocation 2 mammals 3 hearing 4 bats	
5	100	1 X	2 X
6	102	a.5 c.1 e.2	b.3 d.4
7	110	1 X	2 X
8	111	Question (1): Brain – Spinal cord – Nerves. Question (2): 1 brain 2 nerves 3 nervous system 4 Reflexes	
9	118	1 X	2 X
10	120	1 X	2 X

Concept 1.3 – Light and Sight

Activity	Page	Answers	
2	132	1 X	2 ✓
3	134	1 ✓	2 X
4	140	1 X	2 ✓

5	142	Light rays are scattered (diffused) in different directions.
6	150	1 X 2 ✓
7	151	Sound: Mongoose – Humpback whale Light: Firefly Both: Human
8	158	1 X 2 X 3 X 4 X
9	159	Human: 2, 3, 4, 7, 8, 10, 12, 14 Animals: 6, 9, 13 Both: 5, 11

Concept 2.1 Starting and Stopping

Activity	Page	Answers
1	170	1 push – push 2 push – pull 3 pull
2	171	1 ✓ 2 X
3	172	1 ✓ 2 X
4	178	Unbalanced - left
5	180	1 unbalanced 2 pulling 3 position 4 pulling 5 pushing 6 gravity
6	182	1 X 2 ✓
7	189	1 X 2 ✓
9	197	1 ✓ 2 ✓

Concept 2.2 Energy and Motion

Activity	Page	Answers
2	206	1 X 2 ✓
3	208	1 X 2 ✓
4	215	1 ✓ 2 X
6	223	1 X 2 X

		Energy change	
		from	into
1	Electrical		Light and thermal
2	Electrical		sound
3	Electrical		Light and sound
4	Electrical		kinetic
5	Electrical		sound
6	Electrical		Kinetic and sound

Concept 2.3 Energy and Collisions

Activity	Page	Answers
2	240	1 X 2 ✓
3	243	1 sensors 2 seatbelt – airbag 3 steering wheel, dashboard, seats or doors 4 forward 5 thin nylon material 6 inflates
4	252	1 The second runner 2 The first car
5	254	1 longer distance 2 decreases
6	260	1 ✓
7	262	1 ✓ 2 X
9	269	1 X 2 X
10	272	1 X 2 ✓

Main Book Answers

Unit 1

Concept 1.1

Lesson 1

- 1 1 d 2 d 3 a 4 a
5 d 6 b 7 b 8 b
9 d 10 d 11 c 12 d
13 b 14 d

- 2 1 x weaves around each other.
2 x Penguin's body
3 ✓
4 x colorful rocks
5 x dense feathers
6 x to hide from predator or sneak up on a prey.
7 ✓
8 x colorful scales
9 x Fennec fox and caracal live in desert.

- 3 1 c, c 2 a, b 3 d, d 4 b, a

- 4 1 Adaptations. 2 Penguin.
3 Blood vessels. 4 Fat layer.
5 Habitat. 6 Camouflage.
7 Thick white fur. 8 Fennec fox.

- 5 1 fat – feathers
2 blend in
3 brown – black – white
4 camouflage
5 penguins – polar bears

6

Odd word	Reason Because the rest:
Polar bear	Live in deserts.

7

- 1 (1) – (3)
2 (4) 3 (2)

8

- 1 (B) 2 (A)

9

- 1 Because adaptation helps living organisms survive and reproduce in their ecosystem.
2 To stay cool on hot, sunny days.
3 Because the blood vessels in penguin's feet weave around each, so heat transfers to penguin feet.
4 To keep its body warm in extreme cold weather.
5 To stay warm and blend in with the snow to sneak up on its prey.
6 To hide from predator or sneak up on a prey.

10

- 1 The fennec fox can't blend in with the desert landscape, so it can be seen easily by its prey.
2 Polar bear can't keep its body warm in the extreme cold weather so it will die.
3 They can't survive.

11

Look at Revision Book p.4.

Concept 1.1

Lesson 2 Part A

- 1 1 c 2 c 3 c 4 c
5 d 6 c 7 b 8 b
9 c 10 b 11 c 12 b
13 b 14 b 15 d 16 c

- 2 1 ✓ 2 ✓ 3 ✓
4 x short ears.
5 x smaller than
6 x to stay cool at daytime.
7 ✓
8 x All types of sharks live in salt water.
9 ✓
10 x structural adaptation.
11 x doesn't has claws or teeth
12 ✓

- 3 1 Behavioral adaptation.
2 Structural adaptation.
3 Arctic fox. 4 Countershading.
5 Fennec fox. 6 Burrow.

4

Odd word	Reason Because the rest:
1 Snake	Live in polar (cold) regions.
2 Bull shark	Live on the land.

- 5 1 air – behavioral
2 bull shark
3 Arctic fox – fennec fox
4 independently – structural

6

P.O.C	Fennec Fox	Arctic Fox
Habitat	Hot desert	Tundra desert
Fur Color	Tan-colored fur	– White-colored fur in winter – Brown-colored fur in summer
Size of Ears	Extra large	Short

- 7 1 b, d 2 d, b 3 c, a 4 a, c

- 8 1 B 2 B 3 S 4 B
5 S 6 B 7 S 8 B
9 S 10 S 11 B 12 S

- 9 1 The fennec fox has large ears to stay cool during sunny day, while the Arctic fox has small ears to stay warm in the cold weather habitat.
2 To cool its body.
3 To blend in with the green leaves and colorful flowers of the tropical rainforest trees.
4 To sneak up on its prey.
5 Because other sharks live in salt water only, and only the bull shark can live in fresh water.
6 Because one eye searches for food, and the other eye looks out for danger in a different direction.
7 To hold tightly on trees' branches.
8 To scare its enemies.
9 To sneak up on its prey in any season.
10 To keep its body warm in cold climate.
11 Because it is difficult to find food in the desert or tundra.

- 10
- 1 Its scales color changes into green.
 - 2 It can't sneak up on its prey.
 - 3 It can't sneak up on its prey.
 - 4 It puffs its body with air and opens its mouth wide.
 - 5 It can't cool its body in hot weather.
 - 6 It can't warm its body in cold weather.
 - 7 It can't hold tightly on the branches of trees.

- 11
- 1 Polar bear has thick white fur.
 - 2 Panther chameleon puffs its body with air.

- 12
- 1 Bull shark can hunt at day and night.
 - 2 Fennec fox pants like dog to cool its body.

Concept 1.1

Lesson 2 Part B

- 1
- | | | | |
|------|------|------|------|
| 1 b | 2 b | 3 b | 4 d |
| 5 b | 6 c | 7 d | 8 d |
| 9 b | 10 c | 11 b | 12 b |
| 13 c | 14 b | 15 d | 16 c |
| 17 d | 18 c | 19 b | 20 a |

- 2
- 1 x small leaves.
 - 2 ✓
 - 3 x structural and behavioral adaptations
 - 4 x Savannah.
 - 5 x structural adaptation.
 - 6 ✓
 - 7 ✓
 - 8 x Buttress roots
 - 9 x to get sunlight.
 - 10 ✓
 - 11 x to attract bats.
 - 12 x Mangrove tree grows in salty water.
 - 13 ✓
 - 14 ✓
 - 15 x of sunlight.
 - 16 x taproots.

- 3
- 1 Botanist.
 - 2 Amazon rainforest.
 - 3 Savannah.
 - 4 Kapok trees.
 - 5 Acacia tree.
 - 6 Behavioral adaptation.
 - 7 Trunk.
 - 8 Poison.
 - 9 Sharp spines.
 - 10 Thick trunk.
 - 11 Pine tree.
 - 12 Water lily.
 - 13 Mangrove tree.
 - 14 Needles.

- 4
- 1 Buttress roots
 - 2 kapok – wind
 - 3 water – roots
 - 4 mangrove – palm
 - 5 wide – sunlight
 - 6 water – fats
 - 7 bats

5

Odd word	Reason Because the rest:
1 Kapok tree	Are adapted to live in drought conditions.
2 Polar bear	Live in the hot desert.
3 Acacia tree	Live in cold polar habitats.

6 1

P.O.C	Kapok Tree	Acacia Tree
Habitat	Amazon rainforests	Savannah forests
Types of Roots	Buttress roots	Taproots
Shape of Leaves	Hand-like leaves with narrow parts	Tiny leaves are surrounded by sharp spines.

2

P.O.C	Water Lily	Pine Tree	Palm Tree
Habitat	Wetland (Fresh water)	Snow	Hot desert
Shape of Leaves	Wide leaves	Needle leaves	Narrow leaves

7 1 b 2 a 3 d 4 c

8 1 (3) 2 (4)
3 (4) – (2) 4 (1) – wind

- 9 1 The acacia tree has taproots to search for water, while the kapok tree has buttress roots to fix the tree firmly in the soggy soil.
- 2 To prevent animals from eating its leaves.
- 3 To let the wind move through without cutting them.
- 4 To resist the strong wind in the desert.
- 5 To keep animals away.
- 6 To absorb big amounts of sunlight.
- 7 To resist water waves.
- 8 To let the snow slide over its branches without breaking them.
- 9 To prevent animals from reaching its leaves.
- 10 Because it has very long trunk.
- 11 Due to the presence of buttress roots.

- 10 1 They can't reach the deep water in the soil, so acacia trees can't survive in drought conditions.
- 2 Hungry animals will eat its fruits.
- 3 The acacia tree produces poison to make its leaves taste bad.
- 4 Strong wind will cut its leaves.
- 5 The leaves of the kapok tree can't absorb the needed sunlight.
- 6 Its leaves can't absorb the needed sunlight.
- 7 Snow will not slide over its branches, causing the breaking of these branches.
- 8 Plant may adapt and survive or it will die.
- 9 It can't resist wind.
- 10 It can't defend (protect) itself when a giraffe eats from its leaves.

- 11 a. Acacia tree produces a poison when giraffe eats from its leaves.
- b. Kapok tree send smelly message across the forest to attract bats.
- c. Water lily has wide floating leaves.

Concept 1.1

Lesson 3 Part A

- 1 1 c 2 b 3 b 4 a
5 a 6 b 7 b 8 b
9 b 10 d 11 c 12 c
13 d 14 d 15 b 16 b
17 c 18 c 19 a 20 b

- 2 1 x a group of organs.
2 ✓
3 x to esophagus then to stomach.
4 x a muscular organ.
5 x for hours

- 6 x in the mouth
 7 x called esophagus.
 8 x after
 9 x in the small intestine.
 10 ✓ 11 ✓ 12 ✓ 13 ✓

- 3 1 Digestion process. 2 Digestive system.
 3 Mouth. 4 Saliva.
 5 Esophagus. 6 Stomach.
 7 Small intestine. 8 Small intestine.
 9 Large intestine. 10 Anus.

- 4 1 anus 2 saliva – teeth
 3 blood vessels 4 esophagus
 5 small - large 6 small intestine
 7 Esophagus

5

Odd word	Reason Because the rest are:
1 Saliva	Organs of digestive system.
2 Nose	Organs of digestive system.
3 Liver	Organs where food passes through.

- 6 1 d 2 f 3 a 4 b
 5 e 6 c

- 7 1 Mouth 2 Esophagus
 3 Liver 4 Stomach
 5 Pancreas 6 Large intestine
 7 Small intestine

- 8 1 Because it helps in breaking down food into nutrients to provide our body with energy.
 2 Because saliva moistens the food in the mouth to be easily swallowed.
 3 Because they pour their juices on food in the small intestine, which helps break down food into nutrients.
 4 To keep your digestive system healthy.

- 9 1 Food won't be moistened and it will become hard to swallow.
 2 The food will not be moisten, so swallowing food becomes difficult.
 3 The digestive system won't perform its job properly.
 4 Undigested food becomes solid waste that will leave the body through the anus.
 5 Nutrients will not be produced by the digestive system.

Concept 1.1

Lesson 3 Part B

- 1 1 b 2 b 3 c 4 a
 5 c 6 a 7 d 8 c
 9 d 10 b 11 c 12 d
 13 b 14 d 15 c 16 d

- 2 1 x digestive system.
 2 x pharynx
 3 x a muscle
 4 ✓
 5 x by blood vessels.
 6 x during exhalation.
 7 x diaphragm relaxes
 8 ✓
 9 x carbon dioxide gas.
 10 ✓ 11 ✓
 12 x moves downward

- 3 1 Respiratory system.
 2 Carbon dioxide gas.
 3 Pharynx (Throat).
 4 Lungs.
 5 Diaphragm. 6 Bronchioles.
 7 Alveoli.

- 4
- 1 diaphragm
 - 2 respiratory
 - 3 trachea
 - 4 bronchioles
 - 5 alveoli – blood vessels
 - 6 carbon dioxide – oxygen
 - 7 exhalation – inhalation
 - 8 Pharynx

- 5
- 1 carbon dioxide
 - 2 respiratory
 - 3 exhalation
 - 4 expands (relaxes)
 - 5 carbon dioxide

6

Odd word	Reason Because the rest:
1 Stomach	Are organs of respiratory system.
2 Diaphragm	Are organs that air passes through.
3 Trachea	Exist inside the lung.
4 Lung	Are organs of digestive system.

7

Respiratory System	Inhalation	Exhalation
Diaphragm	Contracts and moves downward	Expands and moves upward
Chest Size	Increases	Decreases
Air Rich in	Oxygen gas	Carbon dioxide gas

- 8
- 1 d
 - 2 e
 - 3 b
 - 4 c
 - 5 a

- 9
- (A) 1 Nose 2 Throat
3 Trachea 4 Lung
5 diaphragm

- (B) 1 2 2 4

(C) It contracts and moves downward.

- 10
- 1 To let the oxygen move to the blood to give oxygen to all body parts.
 - 2 Because the inhaled air is rich in oxygen gas, while the exhaled air is rich in carbon dioxide gas.
 - 3 Because when the diaphragm contracts, oxygen gas is pulled into the lungs, while carbon dioxide gas is expelled out of the body when the diaphragm relaxes.
 - 4 To expel carbon dioxide gas outside the body through the nose.
 - 5 To keep the respiratory system healthy.

11

- 1 The chest size decreases and carbon dioxide gas is expelled outside the body through the nose.
- 2 The chest size increases and oxygen gas enters the lungs through the nose.
- 3 Your body doesn't get the needed oxygen gas and get rid of harmful carbon dioxide gas.

Concept 1.1

Lesson 4

- 1
- 1 b
 - 2 c
 - 3 c
 - 4 b
 - 5 c
 - 6 c
 - 7 a
 - 8 a

2

- 1 x gills.
- 2 x oxygen gas
- 3 ✓
- 4 x carbon dioxide gas.
- 5 x air pollution.
- 6 x Human can restore ecosystem.
- 7 ✓
- 8 ✓
- 9 ✓
- 10 x negative

3

Odd word	Reason Because the rest:
1 Gills	Are organs of human respiratory system.
2 Headache	Are caused by air pollution.

4

- 1 Lungs.
- 2 Gills.
- 3 Air pollution.
- 4 Oxygen gas.
- 5 Carbon dioxide gas.

5

- 1 d
- 2 e
- 3 b
- 4 a
- 5 c

6

- 1 Because fish use gills to extract oxygen gas from water.
- 2 Because the gills of fish can extract oxygen from air.
- 3 Because both of them need oxygen gas to breathe.
- 4 To restore ecosystem and decrease air pollution.
- 5 To restore ecosystem and decrease air pollution.

7

- 1 Human can't get the needed oxygen gas.
- 2 A human suffers from lung damage, asthma, and heart problems.
- 3 Air pollution (smog) increases.
- 4 Air pollution (smog) increases.

8

- a. Dumping waste into waterways or soil.
- b. Air pollution is caused by cars exhausts and factory pollution.
- c. Plowing grassland.

Concept 1.1

Lesson 5

1

- 1 d
- 2 c
- 3 c
- 4 c
- 5 d
- 6 b
- 7 d

2

- 1 x skin
- 2 x from amphibians
- 3 ✓
- 4 ✓
- 5 ✓
- 6 ✓
- 7 ✓
- 8 ✓

3

- 1 amphibians
- 2 skin - lungs
- 3 Amphibians
- 4 lungs - air
- 5 gills - water
- 6 Panther chameleon

4

Odd word	Reason Because the rest:
1 Fish	Are amphibians.
2 Human	Live in water.

5

- 1 Amphibians.
- 2 Oxygen gas.
- 3 Skin.
- 4 Lungs.
- 5 Extinction.

6

- 1 To protect amphibians from extinction.
- 2 Because amphibians use their lungs to breathe on land, and can extract oxygen gas from water by their skin.

- 3 Because amphibians could only live in moist environments, while grassland habitats are dry habitats.

- 7 1 Frogs can't live on land.
2 Amphibian numbers will decrease, and they may go extinct.

- 8 Amphibians live in moist environment as it can take oxygen gas from air using lungs and it can get oxygen gas from water using its skin.

Concept 1.2

Lesson 1

- 1 1 a 2 b 3 c 4 d
5 c 6 d 7 c 8 b
9 b 10 c

- 2 1 x The eye
2 x smell sense.
3 ✓
4 x sense of sight.
5 ✓ 6 ✓
7 x reflected from
8 x a structural adaptation.
9 x to locate their prey.
10 ✓

- 3 1 solid 2 touch
3 hearing 4 stronger
5 taste 6 eye

- 4 1 Echolocation. 2 Touch.
3 Hearing. 4 Echo.

- 5 1 skin
2 echolocation – hearing
3 nose 4 sight – taste
5 touch 6 sight - touch

6

Odd word	Reason Because the rest:
1 Eyes	Are senses.
2 Tongue	Are senses.

- 7 1 echolocation – camouflage
2 eyes – ears
3 smell – hearing 4 taste – sight

- 8 1 Echolocation
2 Sight and hearing

- 9 1 Because dolphins have a sharp sense of hearing.
2 Because dogs have sharp senses of smell and hearing.
3 To communicate with each other to move and search for food.

- 10 1 The sound waves return in the form of an echo to the dolphin, so it locates the fish.
2 Dolphins can't locate their prey underwater.

Concept 1.2

Lesson 2

- 1 1 b 2 d 3 d 4 b
5 d 6 c 7 c 8 a
9 c 10 c 11 c 12 d
13 c 14 b

- 2 1 x at night
2 ✓ 3 ✓ 4 ✓
5 x The brain
6 ✓ 7 ✓
8 x two opposite directions.
9 x work together.

10 ✓ 11 ✓

12 ✗ decreases

13 ✓ 14 ✓

15 ✗ Bats

- 3 1 behavioral 2 head
3 brain 4 nose
5 backbone 6 nervous
7 structural

- 4 1 Nocturnal animals. 2 Owl.
3 Bat. 4 Nervous system.
5 Echolocation. 6 Brain.
7 Spinal cord. 8 Sensory receptors.
9 Reaction time. 10 Jerboa.
11 Eye nerves.

- 5 1 brain – spinal cord – nerves
2 sight – hearing 3 nerves
4 brain 5 eyes
6 reaction time 7 Owls – Bats
8 Brain. 9 nerves.

6

Odd word	Reason Because the rest:
1 Dolphin	Are nocturnal animals.
2 Lung	Are organs of nervous system.

- 7 1 The nervous system.
2 No, it is similar in mammals.
3 a. Brain b. Spinal cord
c. Nerves

- 8 1 Because bats and owls become active at night to search for food.
2 To be able to jump for a long distance to escape from danger.
3 Because it has long hind legs.

4 To search for prey everywhere.

5 In very hot places, some animals hunt at night when the weather is cooler.

6 Because owls have sharp senses of sight and hearing.

7 Because bats depend on the echolocation property to locate insects.

- 9 1 I withdraw my hand quickly.
2 Bats can't locate their prey in the dark.
3 Jerboas can't jump for a long distance, so they can't escape from danger.

10 Look at Revision Book p.31.

Concept 1.2

Lesson 3

- 1 1 c 2 d 3 c 4 d
5 c 6 c 7 d

- 2 1 ✓ 2 ✓ 3 ✓ 4 ✓
5 ✗ to the brain
6 ✗ bat's ears
7 ✓ 8 ✓ 9 ✓

- 3 1 brain 2 smell
3 eyes 4 nervous

- 4 1 withdraw – reflex 2 skin
3 nervous system 4 breathe

- 5 1 Nerves. 2 Brain.
3 Reflexes. 4 Nervous system.

- 6 1 c 2 a 3 b

- 7 1 2 2 3 3 1 – 4

8 Because the nervous system is responsible for gathering information, translating them, and sending the proper response to them.

9 I withdraw my foot quickly as a reflex action.

10 Look at the Revision Book p.31.

Concept 1.2

Lesson 4

- 1 d 2 c 3 b 4 b
5 a 6 c 7 a 8 c
9 c 10 d 11 c 12 c

- 2 1 X different roles
2 X Solider ants
3 ✓ 4 ✓ 5 ✓ 6 ✓
7 X feeding season.
8 X between bats.
9 X hearing
10 X sense of smell.
11 ✓

- 3 1 smell 2 shortage (lack)
3 blind 4 higher
5 vibrations 6 hearing

- 4 1 mating 2 smelly messages
3 Humpback whales 4 summer
5 hearing – tones – songs
6 nurse – smelly – scout

- 5 1 Smell sense. 2 Hearing sense.
3 Nurse ants. 4 Scout ants.
5 Soldier ants. 6 Humpback whales.
7 Echolocation.
8 Special cane of blind people.
9 Ants.

6

Odd word	Reason Because the rest:
1 Bats	Use smelly messages.
2 Ants	Communicate by sounds.
3 Owls	Produce high-pitched sound.

7

Hearing Sense	Smell Sense	Touch Sense
– Humpback whales – Bats	Ants	A blind person's cane

8 By producing a series of songs with a wide range of tones.

- 9 1 To alert them to find food when there is a shortage of food.
2 To alert other ants in case of danger.
3 Because bats use their ears for echolocation, which enables them to get information about their surroundings.
4 Because it helps him locate and avoid obstacles.
5 Because both of them emit high-pitched sounds and depend on the echo to locate objects.

- 10 1 Nurse ants send smelly messages to scout ants to alert them to find food.
2 Soldier ants send smelly messages to alert the other ants.
3 Bats can't navigate the surroundings in the dark.
4 Humpback whale can't communicate with each other.

- 5 The cane turns the echo into vibrations that the blind person feels by his thumb.

11 Look at Revision Book p.26.

12 Look at Main Book p.120.

13 Look at Revision Book p.33.

- 14
- | | |
|----------------|---------------|
| 1 echolocation | 2 thumb |
| 3 ears | 4 low-pitched |
| 5 smell | |

- 15
- | | | | |
|-----|-----|-----|-----|
| 1 ✓ | 2 ✓ | 3 x | 4 ✓ |
|-----|-----|-----|-----|

Concept 1.3

Lesson 1

- 1
- | | | | |
|-----|------|------|------|
| 1 c | 2 b | 3 d | 4 d |
| 5 a | 6 b | 7 c | 8 b |
| 9 c | 10 d | 11 d | 12 d |

- 2
- 1 ✓
 - 2 x The human eyes can't
 - 3 ✓ 4 ✓
 - 5 x The fishing cat can
 - 6 x Fishing cat has
 - 7 ✓ 8 ✓
 - 9 x less than
 - 10 x are different
 - 11 ✓
 - 12 x because of light reflection.
 - 13 ✓
 - 14 x The moon is not a source of light.
 - 15 ✓
 - 16 x is visible

- 3
- | | |
|--------------|---------------|
| 1 light | 2 fishing cat |
| 3 excellent | 4 touch |
| 5 reflection | 6 sun |

- 4
- | | |
|-------------------------|---------------------|
| 1 Eye. | 2 Sources of light. |
| 3 Night vision goggles. | |
| 4 Mirror-like membrane. | |
| 5 Fishing cat. | 6 Light. |

- 5
- | | |
|------------------------|------------------------|
| 1 Cats, bats | 2 the moon, mirror |
| 3 light energy | 4 light |
| 5 structural | 6 night vision goggles |
| 7 mirror-like membrane | |
| 8 wider | |

6

Odd word	Reason Because the rest:
1 Dolphin	Are nocturnal animals.
2 Bat	Have a super sense of sight.
3 Moon	Are sources of light.

- 7
- | | | | |
|-----|-----|-----|-----|
| 1 d | 2 c | 3 a | 4 b |
|-----|-----|-----|-----|

8 Figure (3)

- 9
- 1 (1) – (3)
 - 2 (2) – mirror-like – (3)
 - 3 reflect
- 10
- 1 Due to the presence of a mirror-like membrane in the back of their eyes that reflects the light falling on them.
 - 2 Because human eyes don't have a mirror-like membrane.
 - 3 Due to the presence of a mirror-like membrane in the back of their eyes that reflects the light falling on them.
 - 4 Because electric lamps emit their own light.
 - 5 Because the moon reflects sunlight.

- 11 1 It can't see well at night, so it can't hunt its prey.
 2 Human eyes would glow at night, and human can see well at night.
 3 The moon reflects sunlight, so it seems shiny.

Concept 1.3

Lesson 2

- 1 1 d 2 b 3 c 4 b
 5 a 6 d 7 b 8 d
 9 c 10 a 11 c 12 b
 13 c 14 c

- 2 1 ✓ 2 ✓
 3 x allow
 4 ✓
 5 x is opaque object
 6 x reflection of light.
 7 x it absorbs some light and reflects the rest of the light.

- 8 ✓
 9 x less than
 10 ✓ 11 ✓

- 3 1 rough 2 Water
 3 transparent 4 small
 5 smooth 6 most

- 4 1 Transparent materials.
 2 Opaque materials. 3 Rough surface.
 4 Opaque materials.

- 5 1 an opaque 2 straight
 3 bounces 4 a shadow
 5 transparent – lenses
 6 one

6

Odd word	Reason Because the rest:
1 Glass cup	Are opaque materials.
2 Wood	Are transparent materials.
3 Mirror	Are rough surfaces.

- 7 1 Opaque. 2 Opaque.
 3 Transparent. 4 Transparent.
 5 Opaque.

8

Transparent Mediums	Opaque Mediums
Glass – Window – Clear water	Rock – Wood – Skin – Milk

2

Smooth Surfaces	Rough Surfaces
Mirror – Metal	Cloth – Wood – Paper

- 9 (A) 1 b 2 c 3 d 4 a
 (B) 1 b 2 c 3 a

10

- 1 a. an opaque object.
 b. a transparent object.
 2 Figure (B) because the light rays scatter in different directions.
 3 Cloth – Cardboard
 4 a. empty glass b. cardboard
 c. steel bottle
 5 painted (rough)
 6 Light will scatter in different directions.

11

- 1 Because it allows light to pass through them.
 2 Because wood doesn't allow light to pass through it.

- 3 Because the opaque object doesn't allow light to pass through it, but it absorbs some of the light and reflects others.
- 4 Because a glass cup and lens are transparent objects that allow light to pass through.
- 5 Because opaque objects absorb some of the light falling on them and reflect others.
- 6 Because the mirror is a polished surface that reflects light in one direction, while a painted surface scatters light in different directions.

- 12 1 A shadow is formed.
- 2 Light rays reflect off the surface in one direction.
- 3 Light rays scatter in different directions.

13 Look at the Revision Book p.34.

Concept 1.3

Lesson 3

- 1 1 b 2 a 3 d 4 c
- 5 d 6 b 7 c 8 c

- 2 1 x sense of sight.
- 2 x due to a chemical reaction.
- 3 x Fireflies can change
- 4 ✓ 5 ✓ 6 ✓
- 7 x between humans.
- 8 ✓

- 3 1 wings 2 winged
- 3 structural 4 mangrove

4 Fireflies

- 5 1 sight 2 mate - predator
- 3 mangrove 4 chemical reaction
- 5 light 6 wings

6

Odd word	Reason Because the rest:
1 Fireflies	Communicate by sound.
2 Echolocation	Are ways of communication between people.
3 Traffic lights	Are ways of communication by sound.

- 7 1 c 2 a 3 b 4 d

- 8 1 light 2 hearing
- 3 both sight and hearing
- 4 wings

- 9 1 To warn other fireflies off a predator and to attract a mate.
- 2 To light up their bodies to communicate with each other.

- 10 1 They can't communicate with each other.
- 2 Fireflies produce a pattern of flashlights to warn off other fireflies.
- 3 The firefly produces a pattern of flashlights.

- 11 Changing the flash pattern in fireflies.

- 12 The flashes emitted by fireflies help them to communicate with each other to warn other fireflies of predators and to attract a mate to reproduce.

Concept 1.3

Lesson 4

- 1 1 d 2 b 3 a 4 d
- 5 b 6 b 7 d

- 2 1 ✓ 2 ✓
- 3 x A thumb up
- 4 ✓

5 x by his eyes.

6 ✓

- 3
- | | |
|-------------|-----------|
| 1 Language | 2 ears |
| 3 different | 4 decodes |
| 5 red | |

- 4
- | | |
|-----------|----------|
| 1 Code. | 2 Brain. |
| 3 Mirror. | 4 Eye. |

- 5
- | | |
|--------------|----------------|
| 1 codes | 2 fire signals |
| 3 lighthouse | 4 Code |

6

Odd word	Reason Because the rest:
1 Rescue flare	Are ways of communication by sound.
2 Car horn	Are ways of communication by light.

- 7
- | | | | |
|-----|-----|-----|-----|
| 1 d | 2 c | 3 a | 4 b |
|-----|-----|-----|-----|

- 8
- | | | | |
|-----|-----|-----|-----|
| 1 c | 2 c | 3 b | 4 a |
|-----|-----|-----|-----|

- 9
- 1 To use the mirror to flash to attract the attention of rescue helicopters' pilots.
- 2 To communicate together and to transfer information.
- 3 Because lighthouses encode information in flashes of light to guide sailors.

- 10
- Humans can't transfer information and communicate together.

- 11
- It is a pattern that has a meaning.

- 12
- Thumbs-up or Thumbs-down and Facial expressions.

Unit 2

Concept 2.1

Lesson 1

- 1
- | | | | |
|------|------|------|------|
| 1 b | 2 a | 3 c | 4 a |
| 5 c | 6 b | 7 c | 8 a |
| 9 c | 10 d | 11 c | 12 b |
| 13 c | | | |

- 2
- 1 x slower than
- 2 ✓ 3 ✓ 4 ✓ 5 ✓
- 6 x Both of them need pulling force.
- 7 x more powerful than
- 8 x to decrease speed quickly
- 9 x three parachutes.
- 10 ✓

- 3
- | | |
|---------------|-----------|
| 1 more | 2 pushing |
| 3 jet engines | |

- 4
- | | | |
|----------------------|------------|----------|
| 1 three | 2 forward | 3 static |
| 4 Shockwave | 5 increase | |
| 6 decrease – rockets | | |
| 7 Force | 8 pushing | |
| 9 pushing | 10 engines | |

- 5
- | | |
|--------------------|------------------|
| 1 Pushing force. | 2 Pulling force. |
| 3 Shockwave truck. | 4 Parachute. |

- 6
- Look at Revision Book p.41.

- 7
- 1 Pushing force – Pulling force
- 2 Pushing force: kicking a ball.
- Pulling force: opening desk drawer.

- 8
- (A) 1 b 2 a 3 b
- (B) 1 Adam 2 longer
- 3 forward

- 9
- | | |
|--------|--------|
| 1 Push | 2 Pull |
| 3 Push | 4 Pull |

- 10
- 1 Because the ball moves away from you.
 - 2 Because the Shockwave truck is fitted with 3 powerful jet engines.
 - 3 To allow the driver to slow down the Shockwave truck quickly.
 - 4 Due to the pushing force of the air.
 - 5 Because Shockwave truck has more powerful engine than normal truck.

- 11
- 1 The ball starts to move away from me.
 - 2 The normal truck's speed increases.
 - 3 The Shockwave truck slows down quickly.
 - 4 The cart will move forward.
 - 5 The cart move faster and covers a longer distance.

Concept 2.1

Lesson 2

- 1
- | | | | |
|------|------|------|------|
| 1 b | 2 c | 3 b | 4 c |
| 5 a | 6 d | 7 d | 8 b |
| 9 b | 10 d | 11 c | 12 c |
| 13 b | | | |

- 2
- 1 ✓
 - 2 X move objects toward you.
 - 3 ✓
 - 4 X downward.
 - 5 ✓
 - 6 ✓
 - 7 X Unbalanced force
 - 8 ✓
 - 9 ✓
 - 10 X with a greater force.
 - 11 X If unbalanced force
 - 12 ✓
 - 13 X, it will not move.
 - 14 X can not be seen

- 3
- 1 gravity
 - 2 unbalanced – balanced
 - 3 unequal – greater
 - 4 pulling – gravity – pushing
 - 5 position – fixed
 - 6 unbalanced

- 4
- | | |
|------------------|------------------|
| 1 Gravity. | 2 Motion. |
| 3 Force. | 4 Pulling force. |
| 5 Pushing force. | |

- 5
- | | |
|--------------|------------|
| 1 position | 2 balanced |
| 3 unbalanced | 4 pulling |
| 5 push | |

- 6
- | | |
|--------|--------|
| 1 Push | 2 Pull |
| 3 Push | 4 Push |

- 7
- 1 It is Unbalanced force.
 - 2 Left.

- 8
- | | | |
|-----|-----|-----|
| 1 b | 2 c | 3 c |
|-----|-----|-----|

- 9
- 1 Due to the force of gravity.
 - 2 Because the book is affected by two balanced forces, which are the pulling force of gravity and the pushing force of the table.
 - 3 Because the forces acting on the rope are balanced and in two opposite directions.
 - 4 Because the forces that affects the object are equal.
 - 5 Because the forces that affects the object are unequal.

- 10
- 1 The static object will not move.
 - 2 The rope will move towards the greater force.

- 11
- Look at Revision Book p.41.

- 12
- 1 A person walk – Earth revolution around sun.
 - 2 Car moves on a road.
 - 3 Book on the table.

Concept 2.1

Lesson 3

- 1
- | | | | |
|-----|------|------|-----|
| 1 b | 2 d | 3 a | 4 d |
| 5 a | 6 a | 7 c | 8 c |
| 9 c | 10 d | 11 d | |

- 2 1 ✓
 2 X , it will stop moving.
 3 X decreases gradually
 4 ✓ 5 ✓ 6 ✓
 7 X opposite direction
 8 ✓ 9 ✓
 10 X opposite direction.
 11 ✓
 12 X a shorter distance
 13 X friction force.

- 3 1 bigger 2 the same
 3 opposes 4 hard - long
 5 short 6 decrease

- 4 1 Friction force. 2 Friction force.
 3 Friction force.

- 5 1 short 2 Friction
 3 decreases

- 6 1 c 2 d 3 a 4 b

- 7 It is the force exerted when objects rub against each other.

- 8 Car (A) because it covered a longer distance.

- 9 1 X 2 ✓ 3 ✓
 4 ✓ 5 X

- 10 1 Because the wall acts on the moving car with the same amount of force and in an opposite direction of its motion.
 2 Due to the friction force between the ball and the ground that opposes the motion of the ball.
 3 Because the smaller toy moves faster than the bigger one.

- 4 Because of applying the same force on different cars, the small car moves a longer distance than the big car.
 5 Due to friction force that acts in opposite direction to motion.

- 11 1 The car slows down gradually, then stops.
 2 The bike speed decreases gradually, then stops.
 3 The toy car covers a short distance.
 4 The ball covers a long distance.
 5 The speed of the car decreases gradually until it stops.

- 12 The car with smaller mass covers a longer distance than the other car with bigger mass.

Concept 2.1

Lesson 4

- 1 1 b 2 c 3 a 4 d
 5 b 6 d 7 a

- 2 1 X You are not doing a work
 2 ✓ 3 ✓ 4 ✓
 5 X more energy
 6 X a pushing force.
 7 ✓

- 3 1 force 2 energy 3 work 4 gravity

- 4 1 d 2 c 3 a 4 b

- 5 1 Bowling ball 2 great - more

- 6 1 Because force changes energy and allows it to do work.

Concept 2.2

Lesson 1

- 1 1 b 2 d 3 b 4 b
 5 a 6 b 7 b 8 c
 9 c 10 b 11 c 12 d

- 2 1 ✓
 2 X gains kinetic energy.
 3 ✓ 4 ✓ 5 ✓ 6 ✓
 7 X have no kinetic energy.
 8 X Kinetic energy
 9 X stores potential energy.
 10 ✓ 11 ✓

- 3 1 more 2 chemical
 3 kinetic 4 kinetic
 5 potential 6 kinetic

- 4 1 Kinetic energy. 2 chemical energy.
 3 Electrical energy.

- 5 1 electric motors 2 energy - food
 3 Kinetic 4 Kinetic
 5 bottom 6 electrical energy
 7 zero 8 your foot - small box

- 6 1 c 2 a 3 d

- 7 1 (c) 2 (a)
 3 decreases – increases
 4 kinetic – (a) – (d)

- 8 1 Because its speed increases.
 2 Because the stored potential energy changes into kinetic energy that helps the roller coaster move down.
 3 Because the potential energy increases by increasing the height from the ground.

- 9 1 The potential energy of the object becomes maximum.
 2 The stored potential energy changes into kinetic energy.
 3 Its speed increases.
 4 The kinetic energy transfers from the ball to the goal net, so it vibrates.

- 10 1 b 2 a 3 a 4 b

Concept 2.2

Lesson 2

- 1 1 a 2 d 3 c 4 d
 5 a 6 b 7 c 8 d
 9 b

- 2 1 ✓ 2 ✓
 3 X Light energy is the only visible form of energy.
 4 ✓ 5 ✓ 6 ✓ 7 ✓
 8 X has no energy.
 9 ✓ 10 ✓

- 3 1 potential 2 kinetic
 3 energy 4 Force

- 4 1 Work. 2 Energy.
 3 Potential energy.
 4 Kinetic energy.

- 5 1 potential 2 kinetic
 3 light
 4 decreases – increases

6

Odd word	Reason Because the rest:
Chemical energy	Are types of kinetic energy.

- 7 1 d 2 b 3 c 4 a

- 8 1 c 2 b 3 d 4 a

- 9 1 Because the book stores potential energy.
 2 Because potential energy increases by increasing the height from the ground.
 3 Because the speed of the apple increases when falling down from a tree.
 4 Because the car gains kinetic energy during its motion.

- 10
- 1 The potential energy decreases.
 - 2 The potential energy increases.
 - 3 The potential energy changes into kinetic energy.

Concept 2.2

Lesson 3

- 1
- | | | | |
|------|------|------|------|
| 1 c | 2 d | 3 b | 4 a |
| 5 c | 6 a | 7 d | 8 b |
| 9 c | 10 c | 11 d | 12 c |
| 13 d | | | |

- 2
- | | | | |
|---|------|------|------|
| 1 ✓ | 2 ✓ | 3 ✓ | 4 ✓ |
| 5 ✓ | | | |
| 6 X electrical energy is changed into kinetic energy. | | | |
| 7 X Energy transfers | | | |
| 8 ✓ | | | |
| 9 X We can't see | | | |
| 10 ✓ | 11 ✓ | 12 ✓ | 13 ✓ |
| 14 X is potential energy. | | | |
| 15 X into thermal energy | | | |

- 3
- | | |
|-----------------|------------|
| 1 Gravitational | 2 chemical |
| 3 A gas oven | 4 sound |
| 5 chemical | 6 chemical |

- 4
- | | |
|-----------------------------------|--------------------|
| 1 Gravitational potential energy. | |
| 2 Kinetic energy. | 3 Chemical energy. |
| 4 Sound energy. | 5 Electric energy. |
| 6 Chemical energy. | |

- 5
- | | |
|-------------------------|--------------------|
| 1 kinetic | 2 Thermal |
| 3 chemical | 4 light |
| 5 potential – kinetic | 6 kinetic |
| 7 chemical – thermal | |
| 8 electrical – light | 9 potential |
| 10 kinetic – potential | 11 kinetic – sound |
| 12 electrical – kinetic | |

6

Odd word	Reason Because the rest:
1 Chemical energy	Are forms of kinetic energy.
2 Flashlight	Produce sound energy.
3 Light energy	Are invisible energies.

- 7
- | | | | |
|-----|-----|-----|-----|
| 1 d | 2 c | 3 a | 4 b |
|-----|-----|-----|-----|

- 8
- | | | |
|-----|-----|-----|
| 1 b | 2 c | 3 c |
|-----|-----|-----|

- 9
- | | | |
|-----|-----|-----|
| 1 X | 2 ✓ | 3 X |
| 4 ✓ | 5 ✓ | |

- 10
- 1 Because kinetic energy changes into thermal energy.
 - 2 Because electrical energy is changed into light and sound energies.
 - 3 Because there is a chemical energy stored in the food we eat.

- 11
- 1 Its potential energy increases.
 - 2 Potential energy changes into kinetic energy.
 - 3 Chemical energy changes into thermal energy.
 - 4 Electrical energy changes into kinetic energy.
 - 5 The spring stores potential energy in it.

Concept 2.2

Lesson 4

- 1
- | | | | |
|-----|-----|-----|-----|
| 1 d | 2 b | 3 c | 4 c |
|-----|-----|-----|-----|

- 2
- 1 X Energy changes from one form to another.
 - 2 X is a downward
 - 3 ✓
 - 4 ✓
 - 5 X is a form of kinetic energy.
 - 6 X the potential energy stored in it

- 3 1 potential 2 Gasoline
3 kinetic 4 Sound
-
- 4 1 Energy. 2 Chemical energy.
-
- 5 1 light – kinetic 2 work
3 chemical – potential
4 food
-
- 6 1 Because the battery is the source of chemical energy that is converted into light energy.
2 Because food provides the human body with the needed energy to do all activities.

Concept 2.3

Lesson 1

- 1 1 c 2 c 3 b 4 d
5 b 6 b 7 d 8 b
9 c 10 b
-
- 2 1 ✓
2 x its kinetic energy
3 ✓ 4 ✓ 5 ✓ 6 ✓
7 x Seat belts keep the driver's body from moving forward during collision.
8 x Airbags decrease
9 x to deflate
10 x rushed forward.
11 ✓
-
- 3 1 increases 2 Airbag
3 thin nylon 4 Sensors
5 less 6 very big
-
- 4 1 Wrecking ball. 2 Seatbelt.
3 Airbag. 4 Vents. (Holes.)
-
- 5 1 airbags 2 sensors

- 3 dashboard – seats 4 cricket
5 sound 6 Seatbelt – airbag
7 seatbelt 8 steel
9 collision
10 knocking down buildings
11 popping sound.

- 6 1 c 2 a 3 b 4 d
-
- 7 1 b 2 b 3 a 4 b
-
- 8 1 To keep its body from moving forward when the car stops suddenly.
2 Because they absorb the energy of the car during a collision.
3 To allow the driver to get out of the car.
-
- 9 1 The driver can't get out of the car.
2 The speed of the ball increases.
3 The kinetic energy transfers from the bat to the tennis ball.

Concept 2.3

Lesson 2

- 1 1 c 2 a 3 b 4 d
5 d 6 c 7 a 8 c
9 b 10 a 11 b 12 d
13 b
-
- 2 1 ✓
2 x kilogram per hour
3 ✓ 4 ✓
5 x is 25 m/sec.
6 ✓ 7 ✓
8 x kinetic energy decreases.
9 ✓
10 x and affects its kinetic energy.
-
- 3 1 meter 2 speed

- 3 kinetic 4 ÷
5 longer 6 time.

- 4 1 Speed. 2 Speed.
3 Kinetic energy. 4 Speed.

- 5 1 speed 2 distance – time
3 more 4 decrease
5 10 6 kinetic
7 angle of inclination 8 m/sec - km/hr
9 speed 10 meter (kilometer)
11 distance - time

Odd word	Reason Because the rest:
Energy	Are speed and its factors.

- 7 1 c 2 b 3 c

- 8 Car (B) because it covers a longer distance in the same amount of time.

- 9 1 The train's speed = $600 \div 6 = 100$ km/hr.
2 The train's speed = $500 \div 5 = 100$ km/hr.
3 The train's speed = $400 \div 2 = 200$ km/hr.
4 The train's speed = $450 \div 3 = 150$ km/hr.

- 10 1 As the angle of inclination of the ramp increases, the speed and kinetic energy of the object moving on it increase.
2 As the speed of a moving object increases, its kinetic energy increases.

- 11 1 Its speed increases.
2 Its kinetic energy decreases.
3 Its kinetic energy increases.

Concept 2.3

Lesson 3

- 1 1 d 2 c 3 b 4 c
5 c 6 a 7 d 8 b
9 c

- 2 1 X The driver must drive slowly to avoid accidents.
2 X energy transfers
3 X, its kinetic energy decreases.
4 X when the speed of object increases.
5 X Energy is transferred during a collision.
6 ✓ 7 ✓ 8 ✓ 9 ✓

- 3 1 less 2 sound
3 opposite 4 faster

- 4 1 Collision. 2 Kinetic energy.
3 Sound energy.

- 5 1 decreases 2 increases
3 kinetic 4 less
5 becomes zero 6 Collision
7 collision 8 speed - mass
9 increases 10 speed - mass

- 6 1 a. car – light post b. truck
c. cyclist – severe

- 2 Figure (1) because the two cars are moving in opposite directions, so they exert more force during the collision.

- 7 1 Because when the car's speed increases, its kinetic energy increases, exerting more force during an accident.
- 2 Because some of the transferred kinetic energy changes into sound energy.
- 3 Because kinetic energy of an object depends on its mass.

- 8 1 The damage during the collision becomes less severe.
- 2 The damage during the collision becomes more severe.
- 3 The fast-moving car causes more damage than the slow-moving one.
- 4 Kinetic energy transfers between them, and some of kinetic energy changes into sound and thermal energies.
- 5 The kinetic energy of the body increases.

Concept 2.3

Lesson 4

- 1 1 b 2 c 3 a 4 c
- 5 a 6 c 7 c 8 d
- 9 c 10 d 11 d

- 2 1 ✓ 2 ✓
- 3 X its kinetic energy increases.
- 4 X due to friction force.
- 5 X will decrease gradually.
- 6 ✓ 7 ✓
- 8 X is equal

- 3 1 big 2 more
- 3 small 4 mass
- 5 increases

- 4 1 more 2 more
- 3 two 4 decrease – stop
- 5 thermal - sound 6 equal to
- 7 sound – thermal

- 5 1 more – more mass
- 2 object (A) exerts more force
- 3 energy transfers between them

- 6 1 b 2 c 3 c

- 7 1 Because the truck has a bigger mass and bigger engine.
- 2 Because some of the kinetic energy changes into sound and thermal energies during the collision between the balls.
- 3 Because energy doesn't disappear, but it changes into other forms of energy.
- 4 Because some of the kinetic energy changes into thermal energy due to the friction between the cradle's parts.

- 8 1 Its speed increases.
- 2 The ball stores potential energy.
- 3 Their kinetic energy decreases gradually until they stop.

Assessments Model Answers

Assessment ① Concept 1.1 Lesson 1

- Q1 (A)** 1 c 2 d
(B) 1 Adaptation. 2 Camouflage.
 3 Prey.
- Q2 (A)** 1 x 2 ✓ 3 ✓
(B) 1 Thick fat layer 2 Dense feather
- Q3 (A)** 1 c 2 b 3 a
(B) 1 It can't blend in with the snow, so it can't hide and it can't find food.
 2 Animals die or go extinct.

Assessment ② Concept 1.1 Lesson 2

- Q1 (A)** 1 ✓ 2 ✓ 3 x
(B) 1 To hold tightly on the branch of tree.
 2 To prevent animals from eating its fruits.
- Q2 (A)** 1 c 2 c
(B) 1 The snow will break the branches of tree.
 2 It puffs its body with air and opens its mouth wide.
- Q3 (A)** 1 Pine tree 2 Buttress root
(B) 1 Long (strong) roots – structural
 2 brown

Assessment ③ Concept 1.1 Lesson 3

- Q1 (A)** 1 b 2 d
(B) 1 Digestion process. 2 Diaphragm.
 3 Carbon dioxide gas.
- Q2 (A)** 1 ✓ 2 x 3 ✓
(B) The inhaled air is rich in oxygen gas while the exhaled air is rich in carbon dioxide gas.
(C) It moistens food and facilitate swallowing of food.
- Q3 (A)** 1 Trachea 2 Large intestine

- (B)** large intestine – water0
(C) The chest size increases, and oxygen gas enters the lungs.

Assessment ④ Concept 1.1 Lesson 4

- Q1 (A)** 1 ✓ 2 x 3 x
(B) 1 Gills. 2 Air pollution.
- Q2 (A)** 1 c 2 a 3 b
(B) 1 Because gills help fish to take in oxygen from water.
 2 Due to high level of air pollution caused by factories and car exhausts.
- Q3 (A)** 1 b 2 b
(B) 1 Structural – fish 2 Blood vessels.

Assessment ⑤ Concept 1.1 Lesson 5

- Q1 (A)** c
(B) 1 They can't live under the water.
 2 The salamander can't survive.
- Q2 (A)** 1 x 2 x 3 ✓
(B) 1 Amphibians. 2 Skin.
- Q3 (A)** 1 lungs 2 moist
 3 gills
(B) 1 Because amphibians can take in oxygen from air and water.
 2 Because amphibians can survive in moist environments only.

Assessment ⑥ Concept 1.2 Lesson 1

- Q1 (A)** 1 x 2 ✓ 3 ✓
(B) 1 Because dolphins have sharp hearing sense.
 2 Because dogs have sharp hearing and smell senses.
- Q2 (A)** 1 d 2 d

- (B) 1 It can't detect echo, so it can't find food in the dark water.
2 They will be reflected in the form of echo.

Q3 (A) 1 b 2 a 3 c

- (B) 1 Sight and taste senses.
2 No, because it depends on the super sense of hearing not the smell sense.

Assessment 7 Concept 1.2 Lesson 2

Q1 (A) 1 d 2 c

- (B) 1 Nocturnal animals. 2 Reaction time.
3 Bat.

Q2 (A) 1 x 2 x 3 ✓

- (B) 1 Jerboa jumps in zigzag path to escape from predator.
2 Owl has a bowl-shaped face to direct sound into the owl's ears.

Q3 (A) 1 c 2 a 3 b

- (B) 1 You will move your hand away quickly in less than one second.
2 They can't find food and navigate their surroundings.

Assessment 8 Concept 1.2 Lesson 3

Q1 (A) 1 ✓ 2 x 3 x

- (B) 1 Sensory receptors.
2 Reflex actions.

Q2 (A) 1 b 2 a 3 c

- (B) You will move your foot quickly in less than one second.

(C) nerves – nervous system

Q3 (A) 1 Nose 2 Sight
3 Lungs

- (B) 1 It translates the messages and tells the body what to do.
2 It gathers information through the sensory organs and interprets and processes the information.

Assessment 9 Concept 1.2 Lesson 4

Q1 (A) 1 b 2 d 3 c

- (B) 1 Nurse ants.
2 Low-pitched sound.

Q2 (A) 1 x 2 ✓ 3 ✓

- (B) 1 Nurse ants send smelly messages to scout ant to search for food.

2 They can't communicate together.

Q3 (A) 1 vibrations – touch sense (thumb)

2 smell 3 hearing

- (B) To communicate together for mating or feeding.

Assessment 10 Concept 1.3 Lesson 1

Q1 (A) 1 ✓ 2 x 3 ✓

- (B) 1 Source of light. 2 Light.

Q2 (A) 1 b 2 c 3 a

- (B) 1 Night vision goggle – It helps human to see in the dark.

Q3 (A) 1 d 2 c 3 d

- (B) 1 Because it has a mirror-like membrane at the back of its eyes that reflect light.
2 Because moon reflects sunlight falls on it.

Assessment 11 Concept 1.3 Lesson 2

Q1 (A) 1 a 2 c 3 a

- (B) 1 Light rays are reflected in one direction.
2 Shadow is formed on the wall.

Q2 (A) 1 straight 2 opaque

3 smooth

(B)

P.O.C	Transparent materials	Opaque materials
Definition	They are materials that allow light to pass through them.	They are materials that don't allow light to pass through them.

- Q3 (A)** 1 Paper 2 Mirror
(B) 1 smooth – it reflects sunlight in one direction.
 2 rough – it reflects sunlight in different directions.

Assessment 12 Concept 1.3 Lesson 3

- Q1 (A)** 1 a 2 b 3 d
(B) 1 chemical reaction 2 wings.
Q2 (A) 1 x 2 x 3 ✓
(B) 1 A firefly can't communicate with the other.
 2 A firefly produces a chemical reaction inside their bodies that allows them to light up to communicate together.

Q3 (A)

Item(s) can use sound energy	Item(s) can use light energy
Car horn – Language	Fire alarm – Traffic lights

- (B)** To communicate with other fireflies to attract a mate or to warn off predators.

Assessment 13 Concept 1.3 Lesson 4

- Q1 (A)** 1 ✓ 2 ✓ 3 x
(B) 1 Code. 2 Thumb down.
Q2 (A) 1 b 2 c 3 a
(B) 1 eye - brain 2 ear
Q3 (A) 1 b 2 c 3 a
(B) Because facial expressions help other people

predict what we feel or think.

(C) Thumb up and down – Languages.

Assessment 14 Concept 2.1 Lesson 1

- Q1 (A)** 1 d 2 b 3 b
(B) 1 Pushing force. 2 Pulling force.
Q2 (A) 1 ✓ 2 x 3 x
(B) 1 Due to the pushing force of the air in the fire extinguishers.
 2 Because jet airplane has more powerful engine than normal truck.
Q3 (A) 1 force 2 pushing – pulling
 3 more
(B) 1 The ball moves due to the pushing force of your leg.
 2 The cart covers a longer distance.

Assessment 15 Concept 2.1 Lesson 2

- Q1 (A)** 1 x 2 x 3 ✓
(B) 1 Motion. 2 Force.
Q2 (A) 1 a 2 c 3 d
(B) 1 Static object doesn't move.
 2 The ball falls on the ground by the action of gravity.
Q3 (A) 1 c 2 a 3 b
(B) 1 Unbalanced force. 2 Left.

Assessment 16 Concept 2.1 Lesson 3

- Q1 (A)** 1 friction – decrease
 2 shorter 3 longer
(B) Friction.
Q2 (A) 1 x 2 x 3 ✓
(B) 1 Due to friction force that decrease the speed of the ball until it stops
 2 Because the wall acts on the moving car with the same amount of force in the opposite direction of its motion.
Q3 (A) 1 d 2 c 3 a

(B) 1 The speed of the bike decreases gradually until it stops, due to friction force.

2 The ball will covers a longer distance.

Assessment 17 Concept 2.1 Lesson 4

Q1 (A) 1 ✓ 2 x 3 ✓

(B) 1 Gravity. 2 Friction.

Q2 (A) 1 b 2 c 3 a

(B) 1 decreases 2 energy

Q3 (A) 1 c 2 a 3 d

(B) Because the position of the chair doesn't change.

(C) A rolling ball will stop moving.

Assessment 18 Concept 2.2 Lesson 1

Q1 (A) 1 b 2 a 3 b

(B) 1 The speed of the roller coaster increases.

2 Kinetic energy changes into potential energy.

Q2 (A) 1 x 2 x

(B) 1 Kinetic energy. 2 Potential energy.

Q3 (A) 1 kinetic 2 potential

3 electrical

(B) 1 Because the speed of roller coaster increases when it moves down a ramp.

2 Because the roller coaster at the top of a ramp stores the highest potential energy.

Assessment 19 Concept 2.2 Lesson 2

Q1 (A) 1 x 2 ✓ 3 ✓

(B) 1 Because car moving on the road has a kinetic energy.

2 Because potential energy depends on the object's height.

Q2 (A) 1 b 2 c 3 d

(B) 1 Potential energy changes into kinetic energy.

2 The potential energy stored in it decreases.

Q3 (A) 1 potential 2 work

3 kinetic

(B) • Red ball stores greater potential energy, because it is located at a higher position than the other ball.

Assessment 20 Concept 2.2 Lesson 3

Q1 (A) 1 a 2 d 3 b

(B) 1 Because electrical energy is changed into light and thermal energies.

2 Because the food stores a kind of energy called chemical energy.

Q2 (A) 1 x 2 x

(B) 1 potential 2 potential - kinetic

Q3 (A) 1 Food 2 Chemical energy

3 Compressed spring

(B) 1 Potential energy changes into kinetic energy.

2 Electrical energy changes into kinetic energy.

Assessment 21 Concept 2.2 Lesson 4

Q1 (A) 1 ✓ 2 x 3 x

(B) 1 Energy. 2 Chemical energy.

Q2 (A) 1 d 2 c 3 a

(B) The book stores potential energy inside it.

(C) Chemical - light

Q3 (A) 1 Light energy 2 Flashlight

3 Friction

(B) 1 The object's mass.

2 The object's height.

Assessment 22 Concept 2.3 Lesson 1

Q1 (A) 1 b 2 c 3 c

(B) 1 Wrecking all. 2 Airbag.

Q2 (A) 1 ✓ 2 ✓ 3 x

(B) Kinetic energy transfers from the bat to the ball, so the ball move in opposite direction.

- (C) 1 Airbag 2 Seatbelt
 Q3 (A) 1 kinetic 2 nylon – steel
 3 sound

(B) • To allow driver to get out of the car.

Assessment 23 Concept 2.3 Lesson 2

- Q1 (A) 1 x 2 ✓ 3 ✓

- (B) 1 speed
 2 angle of inclination

- Q2 (A) 1 b 2 a 3 c

- (B) 1 The kinetic energy of a toy car decreases.
 2 The kinetic energy of a car increases.

- Q3 (A) 1 d 2 c

- (B) Because by increasing the angle of inclination of a ramp, the speed of the object moving down on it increases and vice versa.

(C) $v = \frac{d}{t} = \frac{600}{3} = 200 \text{ km/h.}$

Assessment 24 Concept 2.3 Lesson 3

- Q1 (A) 1 a 2 d 3 b

- (B) 1 The collision will be less severe.
 2 Kinetic energy transfers, and we hear a popping sound.

- Q2 (A) 1 x 2 x 3 ✓

- (B) 1 Collision. 2 Kinetic energy.

- Q3 (A) 1 increases 2 collision
 3 mass – speed

- (B) • Because a part of kinetic energy changes into sound energy during a collision.

Assessment 25 Concept 2.3 Lesson 4

- Q1 (A) 1 c 2 a
 (B) 1 equal to 2 thermal - sound

- Q2 (A) 1 x 2 ✓ 3 x

- (B) 1 The kinetic energy of the moving object increases.
 2 The travelled distance decreases gradually.

- Q3 (A) 1 b 2 b 3 a

- (B) • Because energy is transferred and converted into other forms, but it can't be destroyed.

Model Exams on Concepts

Model answers

Concept 1.1 Model Exam 1

Q1 (A) small intestine

(B) 1 Frog. 2 Mangrove tree.

(C) 1 To absorb large amount of sunlight.
2 To blend in with colorful leaves and flowers of rainforest trees to hide from its prey or predators.

Q2 (A) Gills.

(B) 1 Alveoli. 2 Camouflage.

(C) 1 It can't blend in with snow, so it can't sneak up on its prey.
2 It can't breathe in water, so it can't survive.

Q3 (A) 1 b

2 b

(B) 1 fat – feathers

2 Pharynx (Throat)

3 lungs – throat

Q4 (A) 1 Behavioral adaptation.

2 Structural adaptation.

(B) 1

P.O.C	Kapok tree	Acacia tree
Habitat	Amazon rainforest	Savannah grassland

(C) 1 To cool its body temperature as it lives in hot desert.

2 Its fur color turns into brown.

Concept 1.1 Model Exam 2

Q1 (A) Saliva

(B) 1 It has a tan-colored fur.

2 It has sharp spines.

3 It has white and thick fur.

4 It has long and strong roots.

Q2 (A) X

(B) 1 Anus.

2 Adaptations.

3 Oxygen gas.

4 Diaphragm.

Q3 (A) 1 b

2 c

(B) 1 trunk

2 V-shaped - tail

(C) Countershading.

Q4 (A) 1 d

2 b

(B) 1 Because camouflage helps animals to hide from their preys and predators in different environments.

2 To allow wind to move through leaves without cutting them.

3 To allow snow slide easily over it without breaking its branches.

Concept 1.1 Model Exam 3

Q1 (A) c

(B) 1 To tear (cut) its prey's flesh.

2 Fennec fox has long ears to lose heat and cool its body, while short ears of the arctic fox help it stay warm.

3 To prevent water loss.

4 Because they pour their juices in small intestine that help in breaking down of food.

Q2 (A) Fennec fox

(B)

P.O.C	Inhalation process	Exhalation process
Movement of diaphragm	It contracts and moves downward.	It expands and moves upward.
The air is rich in	Oxygen gas.	Carbon dioxide gas.

- (C) 1 They can't live on land.
2 Animals will eat its leaves.

Q3 (A) 1 x 2 x

- (B) 1 It produces a poison or sending smelly message through wind.
2 It pants like a dog.
3 It looks for a shaded area during sunny day.

Q4 (A) 1 b 2 c

- (B) 1 To prevent animals from eating its leaves and fruits.
2 To keep its body warm.
(C) It allows air to pass from throat to lungs.

Concept 1.1 Model Exam 4

Q1 (A) Arctic fox.

- (B) 1 To cool its body.
2 To stay warm.
3 To prevent animals from eating its leaves.
4 Because they produce smog and increase air pollution that causes asthma, lung damage.

Q2 (A) a

- (B) 1 Penguin.
2 Starred agama lizard.
3 Water lily.
(C) It changes the color of its scales into green.

Q3 (A) 1 ✓ 2 x

- (B) 1 Alveoli.
2 Behavioral adaptation.
3 Buttress root.

Q4 (A) 1 Structural adaptation.

- 2 Behavioral adaptation.

- (B) 1 acid – soupy liquid
2 water – nutrients

- (C) To blend in with the desert landscapes.

Concept 1.2 Model Exam 1

Q1 (A) Stomach

- (B) 1 Nose. 2 Brain.
3 Nervous system.
4 Owl.

Q2 (A) 1 a 2 c

- (B) 1 To communicate with other mongooses to move from one place to another to search for food.
2 To jump for long distance to escape from danger.
3 To search for food everywhere.

Q3 (A) 1 b 2 c

- (B) You withdraw your hand quickly as a reflex action.
(C) 1 Echolocation. 2 Echo.

Q4 (A) x

- (B) 1 tongue
2 hearing - smell
3 nerves 4 backbone

Concept 1.2 Model Exam 2

Q1 (A) nervous.

- (B) 1 It is the main control center in the human body.
2 It helps the blind person to locate the obstacles around him.

- (C) 1 Because bats depend on echolocation property to find insects in the dark.
2 Because high-pitched sounds travel better through cold water.

Q2 (A) 1 Eyes

- (B) 1 Scout ants.
2 Nocturnal animals.

- (C) 1 It jumps in a zigzag path to escape quickly from danger.

- 2 It can't see tiny faraway movements of its preys.

Q3 (A) 1 b 2 c

(B) 1 brain

2 eye 3 sight – hearing

Q4 (A) 1 Behavioral adaptation.

2 Structural adaptation.

(B) 1 Organ ② represents nerves, while organ ③ represents brain.

2 sensory receptors.

Concept 1.2 Model Exam 3

Q1 (A) Smell

(B) 1 Because it has sharp senses of hearing and sight.

2 Because it has long hind legs.

3 Because weather is cooler at night.

4 To hear all kinds of sounds to find food and escape from danger.

Q2 (A) c

(B) 1 Bat.

2 Withdrawing your hand quickly when touching a hot object.

(C) 1 They reflect in the form of echo to the bat's ears.

2 They can't communicate with each other.

Q3 (A) 1 ✓ 2 ✓

(B) 1 Summer season.

2 Eyes. 3 Echo.

Q4 (A) 1 structural. 2 Behavioral.

(B) 1 nervous. 2 brain.

3 carrying messages from the brain to the body parts and vice versa - backbone.

Concept 1.2 Model Exam 4

Q1 (A) Ants

(B) 1 Because the ear receives the different sounds and send them through nerves to the brain that processes and identify these sounds.

2 To alert the other ants that there is a danger nearby.

3 To find food and to avoid danger.

4 To direct sounds into the owl's ears.

Q2 (A) 1 d 2 d

(B) 1 Echolocation. 2 Ear.

3 Reflex actions.

Q3 (A) 1 x

(B) 1 hearing – songs 2 eyes – ears

3 nervous system

4 food – nurse ants

Q4 (A) 1 b 2 c

(B) It can't jump for long distances, so it can't escape from danger.

(C) 1 Echolocation. 2 Bat.

Concept 1.3 Model Exam 1

Q1 (A) Wood.

(B) 1 Because mirror is a smooth surface that reflects light rays in one direction, while a painted surface reflects light rays in many directions.

2 To allow more light to enter their eyes to find food at night.

3 Because an opaque object doesn't allow light to pass through.

4 To communicate with other fireflies to warn off them from predators or attract a mate.

Q2 (A) d

- (B) 1 Fireflies. 2 The sun.
3 Water.
4 Fireflies change their own flash pattern to match that of another group of fireflies to communicate.

Q3 (A) 1 ✓ 2 x

- (B) 1 Night vision goggles.
2 Light reflection.
3 Opaque materials.

Q4 (A)

Transparent materials	Opaque materials
Lenses Glass bottle	An aluminum pot Rock

(B) opaque – absorbs – reflects – different.

(C) Light rays are reflected in the same direction.

Concept 1.3 Model Exam 2

Q1 (A) Moon

- (B) 1 Because it doesn't allow light to pass through.
2 Because nocturnal animals have larger eyes than humans and their eye pupil open wider than them.
3 Because the glass is a transparent material that allows light to pass through.
4 Because it has a mirror-like membrane at the back of its eyes that reflects light.

Q2 (A) ✓

- (B) 1 codes 2 light
3 wider 4 opaque

Q3 (A) 1 c 2 b

- (B) 1 Light rays are reflected in many directions.
2 It uses its wings to release different flash patterns.
3 A shadow of the opaque object is formed on the wall.

Q4 (A) 1 c 2 d

- (B) 1 The moon.
2 Opaque materials.
3 Sources of light.

Concept 1.3 Model Exam 3

Q1 (A) Sun.

- (B) 1 It is any object that gives off (emits) its own light.
2 It is a pattern that has a meaning.
(C) 1 Because it allows light to pass through.
2 Because mirror is a smooth surface that reflects light rays in one direction, while the panted surface reflects light rays in many directions.

Q2 (A) Dolphin

- (B) 1 Mirror-like membrane.
2 Eye.
(C) 1 They can't communicate with each other.
2 Your eyes send message to the brain that process information and send signals to your body to stop at once.

Q3 (A) 1 d 2 a

- (B) 1 smoothness 2 wings
3 mirrors

Q4 (A) 1 x 2 x

Assess Your Learning (School Book) Model Answers

Unit 1

- 1 1 b 2 c 3 d 4 c
5 b 6 d

2 1

Inhaled Air	Exhaled Air
Rich in oxygen gas	Rich in carbon dioxide gas and water vapor

2

Structural Adaptation in Fennec Fox	Behavioral Adaptation
- Extra-large ears - Tan fur	- Living in burrows - Panting

3

Communication between Humans	Communication between Animals
- Reading – Writing – Cell phone – TV	- Echolocation

- 3 1 ✓ 2 x 3 x
4 ✓ 5 ✓ 6 ✓
7 x 8 x 9 x
10 ✓

- 4 1 hearing 2 ears – brain
3 digestive – stomach – respiratory

- 5 1 Because cats are nocturnal animals that have a mirror-like membrane at the back of their eyes that reflects the light that falls on them.
2 Because bats depend on the echolocation property to locate their prey in complete darkness.

Unit 2

- 1 1 d 2 c 3 d 4 b
5 b 6 a 7 c

- 2 1 (A) Unbalanced. (B) To the left.

2 Car (A):

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{100}{20} = 5 \text{ m/s.}$$

Car (B):

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{300}{20} = 15 \text{ m/s.}$$

Car (B) has the highest speed.

- 3 potential – kinetic

- 4 The truck causes more damage because the mass of the truck is bigger than the mass of the car.

- 3 1 b 2 c 3 e 4 a

PONY Final Exams Model Answers

Model Exam 1

- Q1 (A)** light energy
(B) 1 Gravity. 2 Speed.
 3 Camouflage. 4 Nervous system.
- Q2 (A)** x
(B) 1 Airbags 2 trachea
 3 Shadow – opaque 4 thermal
- Q3 (A)** 1 a 2 d
(B) 1 To resist water waves.
 2 Due to friction force between the ball and the ground that slows down the ball's movement.
 3 Because it doesn't emit its own light, but it reflects the sunlight falling on it.
- Q4 (A)** 1 c 2 a
(B) 1 Electrical energy is changed into thermal energy.
 2 You withdraw your hand quickly as a reflex action.
(C) Figure (1), because the two cars are moving in opposite directions.

Model Exam 2

- Q1 (A)** x
(B) 1 The chest size decreases, and carbon dioxide is expelled outside the body.
 2 They can't hunt at night.
 3 The object stays static and doesn't move.
 4 It produces a chemical reaction inside its body to light up and attract a mate.
- Q2 (A)** Fish
(B) 1 Light. 2 Penguin.

- (C)** 1 It has a thick fur to keep its body warm, and the white fur to blend in with snow to sneak up on its prey.
 2 To slow down their movement.
- Q3 (A)** 1 Seatbelt. 2 Airbag.
(B) 1 Transparent materials.
 2 Kinetic energy.
 3 Owl.
- Q4 (A)** 1 d 2 c
(B) 1 behavioral – structural.
 2 light – thermal.
 3 wider.

Model Exam 3

- Q1 (A)** d
(B) 1 nurse – scout
 2 seatbelts – forward
 3 mangrove – roots
 4 chemical – potential
- Q2 (A)** Pulling force
(B) 1 A long taproot helps acacia tree to search for water, while the buttress root fixes the kapok tree firmly in soggy soil.
 2 Because some of the kinetic energy is converted into sound energy.
- (C)** 1 It won't have an excellent night vision, so it can't hunt at night.
 2 Its potential energy decreases.
- Q3 (A)** 1 x 2 ✓
(B) 1 Energy. 2 Brain.
 3 Night vision goggles.
- Q4 (A)** 1 Dolphins 2 Chemical energy
(B) $v = d \div t = 500 \div 5 = 100 \text{ km/hr.}$
(C) 1 Because it is a transparent material.

- 2 Sheet (b) is a smooth surface, because it reflects light rays in one direction.

Model Exam 4

Q1 (A) x

- (B) 1 Because they respire oxygen gas from water and air.
2 To grip sand when it jumps.
3 Because electrical energy is converted into kinetic and sound energies.

(C) unbalanced – left

Q2 (A) Esophagus

(B) 1

P.O.C	Kinetic energy	Potential energy
Affecting factors	1 Object's mass 2 Object's speed	1 Object's mass 2 Object's height from the ground

- (C) 1 It stores potential energy.
2 It returns back in the form of echo waves, so the dolphin can locate the fish.

Q3 (A) 1 Structural adaptation.

2 Behavioral adaptation.

- (B) 1 Wrecking ball. 2 Friction force.
3 Nervous system.

Q4 (A) 1 d 2 b

- (B) 1 Panther chameleon.
2 Mirror.

(C) $v = d \div t = 450 \div 3 = 150$ km/hr.

Model Exam 5

Q1 (A) b

- (B) 1 potential – kinetic 2 fat – feathers
3 low-pitched, warm
4 light, mirror-like membrane

Q2 (A) Wood

- (B) 1 Echolocation. 2 Work.

- (C) 1 It keeps driver and passengers from moving forward when the car stops suddenly.
2 It sends codes in the form of flashes of light to tell sailors where they are.

Q3 (A) 1 ✓ 2 x

- (B) 1 Because the opaque object doesn't allow light to pass through.
2 To help it jump for long distances and escape from danger.
3 To hold tightly on tree branches.

Q4 (A) 1 c 2 b

- (B) 1 The speed of the bike decreases gradually until it stops.
2 Chemical energy is converted into light energy and thermal energy.
(C) Car (B), because the angle of inclination of the ramp increases, the speed of the car moving on it increases.

Model Exam 6

Q1 (A) Polar bear

- (B) 1 Because kinetic energy is changed into thermal energy.
2 To search for prey in all directions.

- (C) 1 Force. 2 Sources of light.

Q2 (A) Speed

(B)

P.O.C	Inhalation process	Exhalation process
Movement of diaphragm	It contracts and moves downward.	It expands and moves upward.
The air is rich in	Oxygen gas	Carbon dioxide gas

- (C) 1 Bat. 2 Egyptian jerboa.

- Q3 (A) 1 x 2 x

- (B) 1 Light rays are reflected in one direction.
2 Its potential energy increases.

- (C) It is the force exerted when objects rub against each other.

- Q4 (A) 1 a 2 d

- (B) 1 sight – smell 2 mass – speed

- (C) brown – structural

Model Exam 7

- Q1 (A) a

- (B) 1 bronchi – trachea 2 distance – time
3 brain – nerves 4 pulling – gravity

- Q2 (A) Barbary fig

- (B) 1 Kinetic energy. 2 Saliva.
3 Light energy. 4 Eye.

- Q3 (A) 1 Arctic fox 2 Kinetic

- (B) 1 To absorb large amount of sunlight.
2 Because they allow light to pass through.
3 Because its height from the ground increases.

- Q4 (A) 1 a 2 c

- (B) 1 It puffs up its body with air, opens its mouth widely and changes its scales color.
2 They are scattered and reflected in many directions.

- (C) kinetic – potential

Model Exam 8

- Q1 (A) Hearing

- (B) 1 Because it becomes active at night.
2 Because when the car's speed increases, its kinetic energy increases causing exerting a great force during collision.

- (C) 1 Oxygen gas. 2 Anus.

- Q2 (A) Pulling force.

- (B) 1

P.O.C	Acacia tree	Kapok tree
Habitat	Savannah grassland	Amazon rainforest
Shape of leaves	Tiny leaves with sharp spines.	Hand-shaped leaves with narrow parts.

2

P.O.C	Transparent materials	Opaque materials
Definition	They are the materials that allow most of light to pass through.	They are the materials that don't allow light to pass through.

- (C) kinetic – increases

- Q3 (A) 1 b 2 d

- (B) 1 It mixes food with stomach acid and digestive juices and changes food into a soupy liquid.
2 It helps amphibians to extract oxygen gas directly from water.

- (C) When the object's speed increases, its kinetic energy increases and vice versa.

- Q4 (A) 1 Desert lizard 2 friction

- (B) 1 Chemical energy is changed into thermal energy.
2 Soldier ants sent smelly messages to other ants to alert them.
3 Its speed decreases gradually until it stops.

Model Exam 9

Q1 (A) c

- (B) 1 decreases – increases
2 skin – tongue
3 small intestine – liver
4 10

Q2 (A) equal to

- (B) 1 To prevent animals from eating its leaves and fruits.
2 Because it is affected by balanced forces which are the pulling force of gravity and the pushing force of the table.
3 To communicate with each other to move from one place to another or to search for food.

(C) 1 Echolocation. 2 Echo waves.

Q3 (A) 1 b 2 c

- (B) 1 The rope will move toward the team of the greater pulling force.
2 The blood moving up to the penguin's body would be cold causing it to freeze.
3 Potential energy is changed into kinetic energy.

Q4 (A)

Transparent materials	Opaque materials
Air – Glass	Carton – Metal

- (B) 1 Diaphragm. 2 Gravity.
3 Friction force.

Model Exam 10

Q1 (A) Saliva

- (B) 1 Because they help fish to get oxygen gas from water.
2 Because they have shape senses of hearing and smelling.
3 To light up their bodies to communicate with each other.

- 4 Because the kinetic energy of the ball transfers to the goal net during collision.

Q2 (A) b

(B) 1

P.O.C	Arctic fox	Fennec fox
Habitat	Tundra desert	Hot desert
Size of ears	Short ears	Extra-large ears

- (C) 1 It absorbs water from undigested food.
2 It carries messages from the brain to all body parts and vice versa.

Q3 (A) 1 c 2 a

- (B) 1 Code. 2 Motion.
3 Alveoli.

Q4 (A) 1 ✓ 2 x

- (B) 1 You will stop at once.
2 It causes more severe damage.
3 A shadow of the object is formed on the wall.

Governorate Exams Model Answers

Model ① Cairo - New Cairo Directorate

Q1 (A) 1 x 2 x 3 ✓

(B) The chemical energy stored in natural gas changes into thermal energy.

Q2 (A) b

(B) 1 To communicate with each other to attract mates to reproduce or to warn off predators.

2 Because seat belt keeps the driver and passengers from moving forward when the car stops suddenly.

Q3 (A) Code.

(B) 1 a- Behavioral b- Structural
2 a- Potential b- Kinetic

Model ② Cairo – Ain shams Directorate

Q1 (A) 1 c 2 a

(B) 1 Seatbelt 2 Airbag

Q2 (A) ✓

(B) Figure (b) because wooden spoon scatters light rays in different direction.

(C) $\text{Speed} = \text{Distance} \div \text{Time}$
 $= 450 \div 3 = 150 \text{ km/h.}$

Q3 (A) Reaction time.

(B) 1 Because it is hard to find food in hot desert or tundra desert so they adapt and eat insects, fruit, plant roots to survive.

2 Because friction slows it down until it stops.

Model ③ Cairo – Al shorouk Directorate

Q1 (A) 1 b 2 d 3 a

(B) Energy.

Q2 (A) structural

(B) 1 Seatbelt keeps the driver and passengers from moving forward when the car stops suddenly.
2 A wrecking ball used to collide walls of a building to knock down walls or parts of buildings.

Q3 (A) x

(B) 1 thin nylon 2 kinetic

Model ④ Cairo – Badr Directorate

Q1 (A) 1 b 2 b 3 a

(B) The damage would be less severe.

Q2 (A) Hiding lizard between rocks

(B) Because it reflects sunlight.

(C) $\text{Speed} = \text{Distance} \div \text{Time}$
 $\text{Speed} = 300 \div 3 = 100 \text{ km/h.}$

Q3 (A) brain and spinal cord.

(B) It is the force that is exerted when objects rub against each other.

(C) Figure (A).

Model ⑤ Giza – 6th October Directorate

Q1 (A) 1 d 2 a 3 a

(B) Gravitational potential energy

Q2 (A) ✓

(B) 1 It cannot cool its body.

2 Potential energy changes into kinetic energy.

Q3 (A) Lungs.

(B) 1 To store water. – To prevent animals from reaching its leaves to feed on.

2 Because the Shockwave truck has three jet engines.

Model ⑥ Qalyobia – Banha Directorate

Q1 (A) 1 c 2 b 3 c

(B) Pulling force

- Q2** (A) small intestine
 (B) Because it has long hind legs.
 (C) Its potential energy increases.

- Q3** (A) x
 (B) 1 Diaphragm
 2 Light energy, Sound energy

Model 7 Alexandria – East Directorate

- Q1** (A) 1 c 2 a 3 d
 (B) Energy.

- Q2** (A) (✓)
 (B) Because glass allows light to pass through it and things can be seen through it.
 (C)

Behavioral Adaptation	Structural Adaptation
Fennec fox pants like dog.	Fennec fox large ears.

- Q3** (A) Lung
 (B) 1 Seat belt 2 Airbag
 (C) Potential

Model 8 Dakahlia – Educational Directorate

- Q1** (A) 1 a 2 b 3 a
 (B) 1 Unbalanced force 2 Right

- Q2** (A) x
 (B) 1

Transparent objects	Opaque objects
They are objects that allow light to pass through.	They are objects that don't allow light to pass through.
Example: - air - water	Example: rocks - wood

- 2 Kinetic energy: light – thermal
 Potential energy: Chemical –
 Gravitational

- 3 Airbags slow the speed of the driver's motion forward. – Absorb the energy of the passengers on collision.

- Q3** (A) Carbon dioxide
 (B) 1 a-Structural adaptation
 b-Behavioral adaptation

- 2 Speed = Distance ÷ Time = $600 \div 6$
 = 100 km/h.
 3 Small car

Model 9 Port said – Porfouad Directorate

- Q1** (A) 1 c 2 c 3 a
 (B) Gravity (pulling force)

- Q2** (A) x
 (B) 1 Because it reflects sunlight.
 2 Because when the mass of an object increases, its kinetic energy increases.

- Q3** (A) Eye
 (B) 1 Humans could respire oxygen which dissolve in water.
 2 The speed of car decreases until it stops.

Model 10 Matrouh – Educational Directorate

- Q1** (A) 1 x 2 x 3 ✓
 (B) Its kinetic energy increases

- Q2** (A) c
 (B) 1 behavioral - structural
 2 sight - touch

- Q3** (A) Pushing force.
 (B) 1 Because it reflects sunlight.
 2 Because it produces light energy and thermal energy.